


**Violations of Land Use and Building Regulations:  
Evidence from a Case Study in  
Bangalore, India.**

by  
Jayashree Narayana

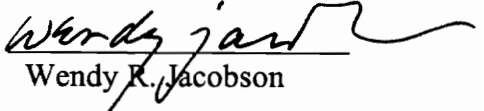
Master's Thesis submitted to the Faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

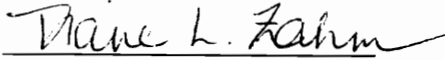
MASTER OF URBAN AND REGIONAL PLANNING

APPROVED:

  
James R. Bohland, Chairperson

  
Anna M. Hardman

  
Wendy R. Jacobson

  
Diane L. Zahm

May, 1996  
Blacksburg, VA.

**Key Words:** India, Bangalore, Planning, Land use, Regulation, Violation

LD  
5655  
V855  
1996  
N373  
c.2

**VIOLATIONS OF LAND USE AND BUILDING REGULATIONS  
EVIDENCE FROM A CASE STUDY IN  
BANGALORE, INDIA.**

by

Jayashree Narayana

James R. Bohland, Chairperson

Urban Affairs and Planning

(ABSTRACT)

Land use and building controls inherited from colonial tradition guide the implementation of urban development plans in developing countries. Current planning research argues that regulatory structures like land use, zoning, and building regulations are inappropriate given existing socio-economic, cultural, and institutional contexts in developing countries (Dowall 1992, Mehta et.al 1989, Njoh 1995, UNCHS 1980). However, little research has been conducted to establish how the violations of building and land use regulations affect the evolution of urban landscapes in developing countries.

This research contends that the combination between inappropriate land use regulations and institutional weaknesses of planning agencies results in a high rate of violations of land use and building regulations. These violations are deemed as having a significant impact on Indian urban development. In order to empirically test these theoretical claims, the study uses a residential neighborhood in Bangalore, India. The case study analyzes six different building and land use requirements that are applicable to all the neighborhood plots. The research examined whether the pattern of violations observed

was consistent with the theoretical argument presented in the research. To this end, the method compared data collected in field surveys with regulated requirements and information from architects and planners in Bangalore and found that:

- Violations of land use regulations indicated a strong economic motivation
- Violations of set back requirements suggested socio-cultural and economic motivations
- Interviews suggested that violations were facilitated by institutional failures and inefficiencies.

Findings from this research will help urban planners in Bangalore tailor regulatory and non-regulatory development controls that are in keeping with citizens' economic, socio-cultural, and institutional goals and realistic projections of compliance.

## ACKNOWLEDGMENTS

I would like to take this opportunity to show my appreciation and gratitude to the following people:

Dr. Bohland, my advisor and committee chair for taking over, guiding me with encouragement in the right direction.

Dr. Hardman, my advisor and committee member for the inspiration, patience, and getting me started.

Prof. Jacobson and Dr. Zahm, my committee members for taking the time to help me with comments and criticisms on my research.

My family- parents, Nalini, Shalini, Shankar, and the rest of the clan for their timely help and support both in India and in the US. A special thanks to my aunt, Uma Murthy for her generosity and motivation.

My good friends both in the US and in India who believed that I would make it - Anu, Pushpa, Suma, Rekha and all the others. A special thanks to Claire, Kalpana, Marcos, and who supported me the whole time. Sheena, Sadasivam and Moorthy, my friends who assisted me with my field survey.

Mr. Narasimha Murthy, Deputy Director of Town Planning, Karnataka State, Bangalore for taking the time and assisting me.

The Staff of the BDA, BCC, and the Town Planning organizations and architects in Bangalore for their help.

# TABLE OF CONTENTS

ACKNOWLEDGMENTS.....	IV
LIST OF TABLES.....	VII
LIST OF FIGURES.....	VIII
LIST OF MAPS.....	IX
<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. THEORETICAL CONTEXT: BANGALORE.....</b>	<b>6</b>
2.1 Urban Planning in Developing Countries.....	6
2.1.1 <i>Town Planning Principles</i> .....	6
2.1.2 <i>Master Plans and Comprehensive Development Plans</i> .....	8
2.1.3 <i>National Development Plans in India</i> .....	9
2.2 Regulatory Controls in Planning.....	11
2.3 Problems with Regulatory Controls.....	12
2.3.1 <i>Lack of Applicability</i> .....	12
2.3.2 <i>Master Plans and Comprehensive Development Plans in Bangalore</i> .....	17
2.3.3 <i>Enforcement Problems</i> .....	21
2.3.4 <i>Planning Institutions in Bangalore</i> .....	25
2.4 Relevance of Literature to Research.....	30
<b>3. RESEARCH CONTEXT.....</b>	<b>32</b>
3.1 History of Bangalore's Growth.....	33
<b>4. RESEARCH METHODOLOGY.....</b>	<b>38</b>
4.1 Case Study Neighborhood.....	39
4.2 Existing Regulations.....	43
4.3 Methods.....	44
4.4 Measures.....	46

<b>5. DATA ANALYSIS</b> .....	50
5.1 Violations of Land Use Regulations.....	50
5.1.1 <i>Location and Market Relationships</i> .....	51
5.1.2 <i>Plot Size Effects</i> .....	55
5.2 Violations of Set Back Regulations.....	56
5.2.1 <i>Land Use Effects</i> .....	58
5.2.2 <i>Plot Size Effects</i> .....	59
5.3 Violations of Plot Coverage Regulations.....	60
5.4 Violations of Floor Area Ratio (FAR) Regulations.....	61
5.4.1 <i>Land Use Effects</i> .....	63
5.4.2 <i>Plot Size Effects</i> .....	64
5.5 Violations of Garage and Set Back Construction Requirements.....	66
5.6 Patterns of Violations.....	67
<b>6. CONCLUSIONS</b> .....	70
<b>BIBLIOGRAPHY</b> .....	78
<b>APPENDIX I</b> .....	83
<b>APPENDIX II</b> .....	91
<b>APPENDIX III</b> .....	95
<b>APPENDIX IV</b> .....	99

## LIST OF TABLES

2.3.2 Master Plans and Comprehensive Development Plans in Bangalore.....	17
2.3.4 History of Planning Organizations and Development Plans, Bangalore.....	26
3.1.1 Annual Growth of Population, Bangalore City Metropolitan Area.....	37
4.1.1 Proposed Distribution of Land Use in 1984.....	39
4.3.1 Distribution of Zoned Land Use, Ganganagar, Bangalore.....	44
4.4.1 Distribution of Plot Size Categories, Ganganagar, Bangalore.....	49
5.1 Distribution of Land Use Violations, Ganganagar, Bangalore.....	50
5.4.1 Distribution of Floor Area Ratio Violations with respect to Plot Coverage and Number of Floors.....	62
5.4.2 Distribution of Floor Area Ratio Violations with respect to Plot Coverage and Set Back Violations.....	62

## LIST OF FIGURES

3.1.1 Population Change.....	37
5.1.2 Distribution of Land Use Violations According to Plot Size.....	56
5.2.1 Distribution of Set Back Violations.....	57
5.2.2 Distribution of Set Back Violations According to Plot Size.....	60
5.4.2 Distribution of FAR Violations in each Plot Range.....	64
5.6.1 Distribution of Set Back Violations with other Violations.....	68

## **LIST OF MAPS**

2.3.2	Boundaries of Different Planning Agencies, Bangalore.....	18
3.1.1	Bangalore's Physical Growth.....	35
4.1.1	Location of Ganganagar.....	40
4.1.2	Ganganagar.....	41
5.1	Location of Zoned Land Use, Ganganagar.....	52
5.2	Location of Land Use Violations, Ganganagar.....	53

# 1. INTRODUCTION

The main intentions of land use, zoning and building regulations are to improve the spatial organization of a city and to help regulate its growth. The effectiveness of development controls depends on the extent of compliance by its citizens. Compliance, in turn, is influenced by whether citizens believe regulations are in their best interest and by the ability of an authority to enforce its land use and building regulations. Land use and building codes in the cities of developing countries over the world have neither been viewed as applicable by the public nor have planners enforced them strictly. The end result too frequently is wholesale violation of building and land use regulations (Sannapaiah 1994).

Most developing countries have adopted Western regulatory models that are economically and culturally inapplicable to their cities (Dowall 1992, Mehta et.al 1989, Njoh 1995, UNCHS 1980). This lack of regulatory applicability influences non-compliance in developing countries (Dowall 1992, Gardiner 1985, Mehta et.al 1989, Njoh 1995, and Wade 1984). This research contends that planning institutions in developing countries also lack effective regulatory enforcement mechanisms. Lack of enforcement in conjunction with the inappropriateness of the regulatory structure creates incentives for transgressing land use, building, and zoning laws. Current research has not interpreted evidence of regulatory non-compliance from both enforcement and applicability perspectives. This study uses a neighborhood area to argue that violations of land use and

building regulations are widespread. Violations are rational responses to regulations that are seen as inappropriate and to enforcement structures that are viewed as corrupt and easy to subvert.

This study first identifies and describes violations of land use and building bye-laws such as set backs, plot coverage, land use, floor area ratio, garage requirements, and construction in set back area regulations in Bangalore, India. The research then examines the frequency and pattern of land use and building violations occurring in a neighborhood in Bangalore. The violations are analyzed in relation to other variables to see whether the theoretical propositions put forward are consistent with observed conditions.

Building and land use violations in residential areas are reported as being ubiquitous features in Bangalore (Reddy in TCPO 1988: 28). However, violations have neither been verified nor analyzed with respect to other variables. Hopefully, by identifying type, frequency, and pattern of violations, new building and zoning laws may be made more compatible with a community's economic, institutional, and socio-cultural character.

Most land use, zoning, and building controls in most developing countries of Africa and Asia have been adopted from existing, colonial regulatory structures popular in mid-twentieth century western Europe. Even while undertaking contemporary revisions, policy makers often blindly accept western planning standards that are inappropriate for regulating urban growth in developing countries (Mehta et.al 1989, Dowall 1992, Njoh 1995, UNCHS 1980).

This research argues that a poor fit between the regulatory structure and the needs of citizens in urban neighborhoods in developing countries encourages citizens to seek strategies to avoid compliance with existing zoning and building codes (Mehta et.al 1989). Moreover, it is argued that the specific non-compliance strategies citizens adopt are a function of the structure and processes of the planning agencies responsible for enforcing regulations. Thus, the frequency and type of land use and building code violations in developing cities can be attributed to the lack of applicability of the existing urban regulations and to the existing enforcement structure and processes of city planning agencies.

Research on land use and building regulations in developing countries has focused primarily on negative effects of regulatory restrictions (Mehta et.al 1989, Dowall 1992, Njoh 1995, UNCHS 1980). The research either explores reasons for inapplicability of regulation (Njoh, 1995, Mehta et.al 1989, Turner 1975, Dowall 1992), or examines the economic effects of regulatory measures (Dowall, 1992). Most researchers have failed to consider that the type and frequency of violations of land use and building regulations may be indicative of inapplicability and enforcement organizational dysfunction in developing countries.

Placed in the larger context of social, economic, cultural, institutional, and bureaucratic factors, this research examines a small piece of the larger puzzle of non-compliance. It is argued that regulatory non-compliance is a result of a combination of inappropriate regulation and institutional enforcement factors. Rather than focus on

institutional behavior and its role in creating an environment conducive to non-compliance, my approach is to measure the level of non-compliance with land use and building codes in a neighborhood in Bangalore, India. I then analyze those violations to see whether the pattern is consistent with my conceptual framework. The research uses a neighborhood in Bangalore as a case study to establish that the pattern of violations supports the argument that non-compliance is a factor of inapplicable regulations and institutional structures.

The analysis is restricted to six categories of land use and building requirements: land use, set backs, FAR (floor area ratio), plot coverage, garage, and construction in set back requirements. Compliance with the six regulations is measured for each plot in the case by comparing existing conditions and the standards set by the development plans.

I also used interviews with practicing architects and public planners in Bangalore to help understand the reasons for the violations. While the empirical findings are not necessarily generalizable beyond the case study area, conclusions about the type, extent, and combinations of violations may better inform planners who draft land use and building regulations. The research makes specific recommendations for modifying land use and building regulations in the case study neighborhood.

This research paper has six chapters. Chapter two situates the research in planning theory literature on developing countries and demonstrates how planning institutions and development plans affect urban environments in India, and Bangalore in particular. The urban context of Bangalore's history and growth is described in chapter three. Chapter four details the research objectives and methods used for data collection. Results of the

analysis of the data is the topic of chapter four. Finally, theoretical argument is revisited and is examined in light of the empirical findings. Some strategies for policy formulation of urban development regulations are also discussed here.

## **2. THEORETICAL CONTEXT: BANGALORE**

The literature on planning theory in developing countries establishes that economic, cultural, and institutional factors affect the extent of compliance with urban development controls in developing cities. A smaller body of the literature also demonstrates how fragmented institutions and inapplicable plans characterize planning in Bangalore.

### **2.1 URBAN PLANNING IN DEVELOPING COUNTRIES**

Developing countries continue to experience enormous urban growth. To cope with this growth requires urban policy and planning approaches that are applicable and enforceable. However, most developing countries still practice traditional planning approaches that can be traced back to colonial administrations (Devas 1993). Planning in developing countries typically consists of a combination of town and National Development planning (Vagale 1988c).

#### **2.1.1 Town Planning Principles**

Town planning has its roots in architecture and public health engineering in Western Europe and England in particular. Traditionally, town planning dealt with the orderly, aesthetic, and healthy layout of buildings and land uses. Equity of distribution of land and other resources like water, air, public services are also important considerations

of town planning. It guides a city's growth and fulfills the aims and aspirations of the citizens for a happy and healthy environment (Poulose 1979: 16). Keeble (1964) defines town planning as *'the art and science of ordering the use of land and the character and siting of buildings and communication routes so as to secure and maximize the practicable degree of economy, convenience, and beauty.'* (as quoted in Devas and Rakodi 1993: 41). Many former colonies of European countries including India have adopted town planning principles (Devas and Rakodi 1993). Principles that presently guide town planning in India, for example follow from Poulose's goals (1979: 21) of modern town planning:

- Orderly arrangement of different uses in the city
- Efficient circulation system with different modes of transportation
- Development of each part of the city to optimum standards for maximum economy
- Provision of safe, sanitary, and comfortable housing to meet the needs of all citizens
- Provision of recreation, schools, and other community services at reasonable standards and locations
- Provision of adequate power, water supply, sewerage, utilities, and public services at reasonable costs.

Town planning principles had been used to develop master plans and comprehensive development plans for Bangalore since the 1960s. Bangalore's first exposure to town planning was the creation of large parks in the city's center during the late 1800s which were products of British planning (Gist 1957). The scope and extent for planning in Bangalore was limited until after India's independence in 1947 as no planning agency was established before independence. During the post independence period however, planning institutions and development plans for the city were implemented in the

hope that they will influence, regularize, and control Bangalore's growth.

### 2.1.2 Master Plans and Comprehensive Development Plans

Town planning principles are used to devise rational, systematic, and comprehensive master plans to control urban development in developing countries. The form of town planning practiced in India, has its roots in the British planning heritage (Devas 1993: 65, McAuslan 1989: 244, Njoh 1995: 344, Rivkin 1976: 36, Hardoy and Satterthwaite 1987: 305). The Garden City concepts in master planning which were in vogue in post-war Britain, were exemplified by vast green-belts around cities in developing countries (Devas 1993: 71), and Bangalore in particular. Master planning involves an end-state 'blueprint' for the city. The main objective of such plans was to limit the growth of the city, as planners considered the city unhealthy, and undesirable.

Poulose (1979: 22), Payne (1977: 70), and Devas (1993: 70-75) criticize master planning approaches in developing countries for the following reasons:

- Preoccupation with plan document preparation instead of implementation
- Too focused on all issues and too comprehensive -- takes time and resources to update; no key issues are identified
- Dominance of spatial and land use issues over social, economic, or environmental issues
- Negatively focused on limiting growth regardless of whether it is applicable or not
- Plan caters to unrealistic urban population projections
- Unreasonable and unrealistic projections of public investments
- Separation of plan making from decision making and implementation
- Lack of mechanisms for controlling land development due to factors of legislative weaknesses, bureaucratic failures, corruption, or a lack of enforcing machinery
- Formulation of a rigid, detailed, zoning plan that is unrelated to economic, social, and political realities

- Plans reflect middle and upper class values
- Plans did not reflect the city's true socio-cultural, political, or even climatic contexts

Despite these criticisms of master planning techniques, it is still a popular approach to planning in developing countries because of:

- Professional training and the ideology of planners,
- Professional vested interests,
- Master plan documents serve the interests of politicians and donor agencies, and
- Difficulty in changing the legislative system of planning inherited from colonial powers (Devas 1993: 73-74 and Payne 1977: 70).

In India, physical planning is still the accepted pre-requisite for orderly and efficient growth of urban areas (Poulose 1979: 27). In contrast, recent urban research acknowledges that urban planning should include more than just physical planning. Comprehensive planning should involve aspects of economic, social, political, and cultural factors that affect development (Devas and Rakodi 1993).

### 2.1.3 National Development Planning in India

National development planning has been an important planning approach in many centralized economies. Because it addresses problems at a different scale, national development planning also deals with the social and economic forces that influence patterns of development and plan implementation (Devas and Rakodi 1993).

Land is under state jurisdiction according to the Indian Constitution. It is mainly the state's responsibility to formulate and to implement land use and control policies. The implementation of these development controls requires the cooperation of national, state,

and local agencies. National control of urban development is manifested by the five year plan system that has existed since independence in 1947 (Sheth 1989: 56).

A National Development Plan is of a five year plan system that addresses crucial issues in India's development. The third five year plan (1961-1966) for example, established an urbanization policy that prescribed the use of the master plan approach. This marked the establishment of master plans for more than 400 towns and cities in India. The plan discussed growth in terms of metropolitan limits, conurbation area, green-belt, and 'urbanizable' limits (Ramachandran 1989: 291).

The national Town and Country Planning Act of 1961 (TCPA) is the basis for all planning legislation after 1961 (Sheth 1989: 57). The British Town and Country Planning Acts served as models for their Indian counterparts. Each state in India adopted the Town and Country Planning Act of 1961 as the basis for their planning functions. The Karnataka Town and Country Planning Act (KTCPA) of 1961 regulates urban development in the state of Karnataka for which Bangalore is the capital. The KTCPA is: *"an act that provides for the regulation of planned growth of land use and development and for the making and execution of town planning schemes in the State of Karnataka."* (KTCPA 1961: 1). Its main provisions include:

- Creating conditions favorable for planning and replanning urban and rural areas in the state in light of providing civic and social amenities for all citizens
- Controlling unauthorized and uncontrolled development of land
- Preserving and improving existing recreational facilities and other amenities that contribute towards the balance of land use
- Directing the future growth of populated areas in the state (TCPA 1961: 1-2)

## 2.2 REGULATORY CONTROLS IN PLANNING

Planners use different instruments to improve living conditions and regularize growth in cities. These include:

- Public ownership of land
- Legal regulation of private land ownership and tenure
- Legal powers to control private use and development of land
- Government provision of infrastructure and urban services
- Government construction of housing and public buildings
- Taxation of land and land development (Devas and Rakodi 1993: 47, Rivkin 1976: 10)

The specific tool used depends on the resources available and their applicability in the given contexts. The goal is to enforce the existing statutes effectively so as to achieve policy objectives. In most developing countries, legal regulations of private development activities are the primary tools used for master plan enforcement. These legal regulations include land use, zoning, building bye-laws, and subdivision requirements (Lang 1994). Subdivision regulations dictate the manner in which conversions of land of certain sizes occur (Levy 1992: 110, Rivkin 1976: 38, Njoh 1995: 344, Vagale 1988c: 8-9). Zoning laws specify permitted uses of buildings in residential, commercial, industrial, and public-semipublic zones (Njoh 1995: 341-344). Building regulations specify site layout requirements, structural requirements of buildings, uses of buildings, and procedural matters for all construction (Levy 1992: 111, Rivkin 1976: 38, Njoh 1995: 344). Site layout typically include set back<sup>1</sup>, FAR<sup>2</sup>, and building height requirements.

---

<sup>1</sup> Set back: Space between the building line and the plot line.

<sup>2</sup> FAR: Floor to Area Ratio.

The roots of legal regulation of urban development lie in the latter half of the nineteenth century when the notion of public health was a consideration for planners. Concern for the living conditions of the working class in the late nineteenth century England resulted in the first building by-laws (Devas 1993: 66, Njoh 1995: 344, McLoughlin 1973: 14). The main intention was to improve the construction of housing and thus create a safer and healthier environment. So, the Town Planning Acts of 1919 and 1932 were implemented.

### **2.3 PROBLEMS WITH REGULATORY CONTROLS**

Although regulatory mechanisms remain popular in most developing cities, problems exist because of their utilization. In general, these problems stem from two factors:

- Lack of applicability of development regulation and
- Institutional problems, bureaucracy, and corruption

#### 2.3.1 Lack of Applicability

The discussion on lack of applicability of urban development regulation can be attributed to the following reasons:

*1. Imposed development regulations ignore cultural, and religious traditions and subscribe to western planning ideologies--* Professional training, ideology, and vested interests of planners in developing countries makes changing the planning systems that were inherited from colonial powers difficult (Devas 1993: 74). Development regulations

thus tend to be static and unchanging, not unlike the master plans (UNCHS 1980: 19, Devas 1993, Njoh 1995: 338, Mehta et.al 1989: 51, Sannapaiah 1994: 116). The use of Western logic in formulating regulation ignores religious and cultural norms like the Vastu Shastra that have no confirmed scientific basis. Most public planning agencies in developing countries strongly believe that solutions to urban problems lie in technology because they subscribe to the rational and scientific paradigms of planning. This affects the extent to which citizens comply with the regulatory system (Hardoy and Satterthwaite 1987: 305).

Njoh (1995: 348) argues that local land use and zoning requirements which do not acknowledge traditional residential designs go against family and community structures in Cameroon. Building regulations in Kumba specify that houses be oriented towards the street and not around courtyard in which traditional joint-families live. This lack of acknowledgment of traditional planning and design methods is also evident in India as the Vastu principles of architecture and planning are disregarded in current zoning practices. Indian cities traditionally had a greater mixing of land uses that also increased settlement densities. However, current zoning separates perceived incompatible uses like residential, commercial, and industrial uses and may reduce the city's cultural legibility (Sannapaiah 1994). Combination of western ideology and neglect of traditional cultural norms thus provides several incentives for regulatory non-compliance.

*2. Regulatory standards are high and their compliance imposes excessive costs on the citizens--* The rational model leads planning agencies to adopt high building standards that

often reflect middle and upper class values in developing countries (Mehta et.al 1989: 51). These building standards are based on planners' ideal notions on urban development that are influenced by Western planning models. The higher standards of development controls impose compliance costs to citizens and make housing unaffordable to lower income households (Dowall 1992: 19; Mehta et.al 1989: 51, Sannapaiah 1994: 115, Hardoy and Satterthwaite 1987: 305).

Mehta et.al (1989: 50-52), Sannapaiah (1994: 115), and Hardoy and Satterthwaite (1987: 305) attribute some problems of unsuitability of building legislation to the technical applicability and general poverty of the public. They state that building regulations in developing cities are technical manuals with instructions in construction and engineering. The specified standards are high, expensive to comply with as they are more rigorous than local practices and they thus hinder development of low-income settlements (Rodwin 1981: 175-179, Sannapaiah 1994: 115). The regulations also use confusing jargon that makes their interpretation and implementation difficult (Vagale 1988c).

Njoh (1995: 345-350) who studied building and land use regulations in Kumba, Cameroon, identified four aspects of building and land development regulations that affect applicability as:

- Land use activity: rigid segregation of land uses increases distance of travel to work and results in inefficiency of settlement. This also discourages informal sector activities that are vital to the city's economy.
- Building plot servicing: determine the requirements for access roads, water, and sanitation. Requirements are inconsistent with existing conditions and are unattainably high.
- Building plot sizes and layout: determine the requirements of building plot sizes and building layout. They are minimum plot areas, building heights, FAR, and set backs. These standards are excessively high and result in vacant spaces that could otherwise have been built up. They limit the amount of area and therefore not viable economically.
- Building/housing standards and materials: standards are too high and biased against locally available materials. This follows again from importing foreign standards on building materials and structural requirements.

### *3. Instituted development regulations ignore existing urban land and commercial*

*markets that influence the development of urban land--* Land supply constraints are

another negative externality of regulatory systems (Dowall 1992: 16). Zoning and land

use regulations restrict the amount of land available for urban development and

discourages residents from obtaining higher returns on their land. Regulations can create

excessive demand for urban land that elevates its market price and makes land less

accessible to low-income development (Rodwin 1981: 175).

According to McDonald (1994: 40), Bombay and New Delhi face a maze of land use regulations that have paralyzed development of prime real estate. Urban research in the late 1980s and early 1990s suggests that housing markets are inefficient due to the presence of strict, rigid, and inapplicable development regulations (Bhattacharya 1990: 84, Turner 1985: 154, Dowall 1992: 15). Studies confirm the existence of an urban informal sector because of government regulations (Dowall 1992: 15, Turner 1985: 155).

Traditionally, cities in India tend to have a greater mix of land uses than modern cities and this contradicts current zoning requirements (Sannapaiah 1994: 115). With green-belts, regulations aim at restricting the amount of land available for development in the city. Demand for restricted commercial land is high in residential areas, and this tends to push land values up for commercially zoned plots in residential areas. This increases activity in the informal sector and provides economic incentives for violating land use regulations (Sannapaiah 1994: 116, Dowall 1992).

Location and demand for services are two factors that influence development and geography of urban commercial and residential markets. Yet, when development regulations are instituted they often ignore these considerations. Planners' ideal notions about location of different land uses guides the master planning process (Dowall 1992). But, in developing countries' cities land markets traditionally create a greater mix of land uses than is commonly allowed in current master plans (Sannapaiah 1994). Thus, complying with land use regulations that do not account for different market forces may not be to community's benefit.

Additionally, the economic benefit from violating land use regulations may be higher than the costs of detection and fines. The risk of detection may be minimal due to institutional inefficiencies and lack of monitoring (Sannapaiah 1994). Lack of applicability and affordability result in circumstances that encourage citizens to advance strategies for non-compliance.

### 2.3.2 Master plans and comprehensive development plans in Bangalore

In Bangalore, master planning and comprehensive development planning techniques were used extensively to control and guide urban development (Figure 2.3.2 and Map 2.3.2). In 1961, the Bangalore Metropolitan Planning Board (BMPB) was created for the purpose of formulating and implement the first master plan for Bangalore City. This was the Outline Development Plan (ODP) which was approved by the Government in May 1972. Planning regulations and zoning laws were first adopted after its approval.

#### 2.3.2 History of Planning Organizations and Development Plans, Bangalore

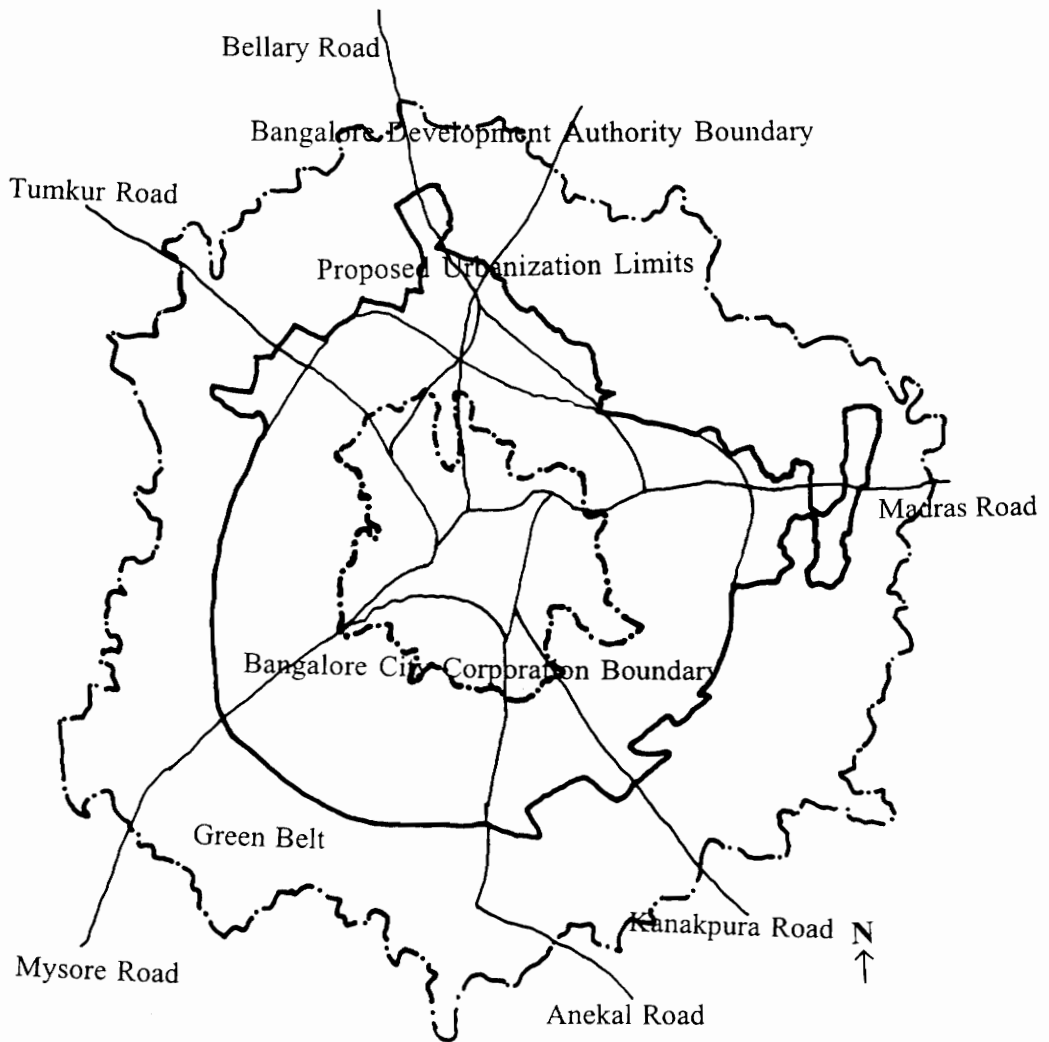
Year	Development Plan	Area	Authority
1952	-	500 sq.kms	Statutory authority
1961	Outline development plan (1972)	317 sq.kms	Implement ODP
1976	Comprehensive development plan (1981)	449 sq.kms	Implement CDP
1986	-		Bangalore Districts
1995	Comprehensive development plan (1995)	1279 sq.kms	BDA* limits
1995	Comprehensive development plan (1995)	400 sq.kms	City limits

Source: TCPO 1988

The next master plan for the Bangalore Metropolitan Region was the 1981 Comprehensive Development Plan (CDP). BDA implemented the plan after approval from the government in 1981 (TCPO 1988). The CDP was amended in January, 1995. One of the land use policies in the CDP is to limit high density construction that is thought to pose risks of public health. Also, any change in land use requires permissions from the

---

\* BDA: Bangalore Development Authority



*Map 2.3.2 Boundaries of Different Planning Agencies, Bangalore.*

*Source: Bangalore City CDP, 1995*

BCC and the BDA. The CDP encompassed an area of 317 sq. kms. in 1976 which was then increased to 449 sq. kms. in 1981 and currently, the it encompasses an area of 1279 sq. kms (TCPO 1988). The CDP zones land for residential, commercial, industrial, public and semi public, traffic and transportation, parks and open spaces. Both land use plans and regulations are included in the CDP. These regulations are aimed at: *“creating a healthy urban environment to enable the citizens of Bangalore to live in comfort and to promote the beauty of the city.”*, (CDP 1995: Preface).

Its main provisions are:

- To apply reasonable limitations to the use of land and buildings
- City is divided into different use zones such as residential, commercial, industrial, public, and semi public
- Each zone has its own set of regulations
- To provide adequate light, air, protection from fire, and healthy living conditions through the use of regulations
- Non-conforming uses are gradually eliminated over many years
- Use the zoning regulation and its enforcement as a tool to adhere to the land use pattern of the master plan (CDP 1995: 1-2)

The applicability of Bangalore’s master plans can be criticized in its ignoring of economic, social, and cultural conditions. Bangalore faces difficulty in changing its legislative system that was inherited from colonial agencies. The city’s master plans use western logic in their formulation and ignore religious and cultural traditions that have no modern scientific basis. Building bye-laws are not in conjunction with the traditional ‘Vastu Shastra’<sup>\*\*</sup> and this adds to the incentives for violating regulations (informational interviews with architects 1995). Planners still subscribe to modern approaches of rational

---

<sup>\*\*</sup> Ancient vedic texts that define design and planning of cities

and technical solutions to current urban problems that are very complex and multidimensional. Professional training, ideology, and vested interests of planners prevails over interests of citizens (Mr. Vimal Narayan and My. Krishna Murthy 1995).

The imposition of western standards of urban development is directly linked to making compliance expensive in Bangalore. Standards for set back, floor area, plot coverage, and land use requirements are restrictive and limit the amount of potential floor area. This is compounded by the fact that the cost of both residential and commercial land in Bangalore is rising rapidly. Thus, according to architects and public planning officials (interviews with Mr. Vagale, Mr. Girish, Mr. Radha Krishna, and Mr. Narasimha Murthy, July 1995), citizens violate land use and building regulations because the economic and personal benefits from violating regulations are substantially higher than either the benefits of complying with the regulations or the costs of detection and sanction. Even when the risk of detection and punishment is high, citizens circumvent the system with bribery.

The city traditionally had a greater mix of commercial and residential land use than allowed by current land use plans. They restrict the amount of land available for development, creates excessive demand for urban land, and increases market value. This restricts low-income settlements and makes housing costly to the urban poor in Bangalore. Master plans and comprehensive development plans of Bangalore ignore existing land and commodity markets that influence its urban development. Thus, complying with land use and building regulations does not make either economic or cultural sense to citizens (Sannapaiah 1994).

Interviews with architects and planners in Bangalore supported the existing literature on the inapplicability of development regulations in developing cities. They confirmed that:

- citizens violate land use and building regulations to make maximum use of their land either by legal or illegal means due to its high cost;
- standards for building are too high and complying with them does not fulfill building requirements of the citizens of Bangalore.
- Violations may occur from a lack of supervision due to bribery and understaffing of planning agencies (interviews with Mr. Vagale, Mr. Girish, Mr. Radha Krishna--architects, Mr. Krishna Murthy, Mr. Narasimha Murthy --planners, Bangalore, July, 1995)

### 2.3.3 Enforcement Problems

Although, a lack of applicability creates a necessary condition promoting non-compliance, it is not sufficient to foster widespread violations. Violations of regulations occur only if enforcement is minimal or can be circumvented with minimal risk. Many factors contribute to making institutional enforcement minimal and inefficient.

Institutional problems in developing countries can be categorized as problems with centralized bureaucracies, excessive demand for regulatory services, lack of trained staff, and small staff size that leads to delays and inefficiencies (Hardoy and Satterthwaite 1987: 305).

Public planning organizations in developing countries have regulatory and allocative powers. Site review, land use, and building regulations are regulatory processes that are instituted to ensure planned allocation. Moreover, public officials have significant discretionary authority in the allocation of land use and infrastructure within the city

(Gardiner 1978). Large, centralized, and fragmented organizations in developing countries dedicate themselves to the theoretical process of planning with ideal goal statements and elaborate, inapplicable plans (Devas 1993: 70-5, Dowall 1992: 15, Mehta et.al 1989: 50, Payne 1977: 70, Turner 1985: 152). The complicated system of urban development controls looks good on paper, but has hardly any effect in reality (Mehta et.al 1989: 51, Turner 1985: 152, Sannapaiah 1994: 145).

An authority that is concentrated in a single agency, can create inequities in land resource distribution, particularly if the agency is susceptible to political manipulation both in its allocative and regulatory processes (Mehta et.al 1989, Hardy and Satterthwaite 1987: 305). Citizens with more access, resources, or power to influence the system, like the wealthy, may receive more benefits than those with neither the resources nor the power to receive favorable decisions of resource allocations. Government officials and regulations allocate land and other resources unevenly and these result in inequities and delays in the legal and administrative system. Sources of delay include organizational behavior that stresses strict adherence to elaborate rules and regulations. Public agencies forget the worthy and necessary purposes of the rules. Rigid enforcement of these rules without other considerations becomes an end in themselves (Bapat 1982, Sannapaiah 1994: 116). Regulations exist only to serve as supplementary sources of income to the staff of public planning agencies in Bangalore (Mr. Narasimha Murthy 1995).

The need to seek special intervention increases if the 'normal' process of building approval is characterized by inefficiencies that seem like unnecessary barriers to those

seeking building approval (Wade 1984). Bureaucratic inefficiencies and administrative delays result when the enforcement staff are not able to cope with the tremendous demand for building approvals and permits. These bureaucratic delays and inefficiencies have real costs for developers and builders. Delays and undue requirements have opportunity and transaction costs that decrease the return on land development. This often imposes such high costs on citizens for enforcing their property rights that they are forced to seek alternative strategies to circumvent the system (Jagganathan 1987, Sannapaiah 1994: 115). Citizens choose one or both of two strategies: first is to employ bribery or other corrupt practices to speed up the process of building approval or to have officials overlook violations; the second is to ignore the regulations altogether in the hope that infractions go undetected and fines will not be imposed.

Local government institutions in India are notorious for their bureaucratic red-tape, delays and corruption. Their harmful effects of this have multiplied geometrically and have retarded the pace of development. This problem has permeated all public enterprises and corporations in all sectors of development, both in the center and the states. No realistic discussion of development and growth occurs without the mention of bureaucratic red-tape and delays (Wade 1984, Bapat 1982, Sannapaiah 1994: 114).

Centralization of bureaucracy and a fragmented institutional structure encourages lack of accountability and officials can accept bribes without the fear of detection and sanctions. Opportunities for corruption and rent seeking are higher in planning institutions with rigid regulatory systems in which officials have discretionary powers than in agencies

where power is more diffused and collective (Wade 1984). In the former, citizens can bypass the bureaucratic procedures simply by bribing building inspectors to waive or overlook the regulations without fear that those decisions will be reviewed by others.

Some citizens simply ignore the regulations in the belief that they are irrelevant (Mehta et.al 1989: 54, Turner 1985: 151, Sannapaiah 1994: 147). For new construction in Bangalore, for example, building inspections are either cursory or not mandatory for electricity and water hook-ups and this allows violations often to go undetected. Again, bureaucratic delays and inefficiencies in the inspection process permits an 'ignorance of law' strategy, for the fear of detection is reduced drastically. With the fear of detection and fines being remote, an environment that is conducive to regulatory non-compliance is created (Mr. Narasimha Murthy, Mr. Vimal Narayana, Mr. Krishna Murthy, Mr. Girish, and Mr. Radha Krishna 1995). Also, vague and confusing legal jargon of urban regulation in Bangalore makes their interpretation and enforcement more controversial and difficult and citizens can attribute their non-compliance to unclear regulations (Vagale 1988c: 14).

Bribery and corruption are rational responses to a system that incurs unnecessary costs of bureaucratic inefficiencies and offers opportunities for officials to supplement their income (Gardiner 1978, Wade 1984). Higher levels of bribery, corruption, bureaucratic delays in centralized and fragmented bureaucracies facilitate higher levels of regulatory non-compliance. Unfortunately, factors that characterize the existence of bureaucratic red-tape and corruption in many public organizations in India are common to the public planning agencies in Bangalore (Wade 1984).

#### 2.3.4 Planning Institutions in Bangalore

Bangalore's planning institutions have a relatively short history (Figure 2.3.4). Moreover, the different agencies that administer urban controls in Bangalore are not coordinated. Regulatory authority is divided between various national, state, and local agencies (Deshpande et.al 1981: 215, McAuslan 1993: 246, TCPO 1988). In effect, no single organization is in charge of urban development in Bangalore. The lack of coordination provides citizens many opportunities for violating urban development regulations (McAuslan 1993: 246, TCPO 1988).

The first planning organization in Bangalore was the City Improvement Trust Board (CITB) in 1945. After India's independence in 1947, two distinct development units of Bangalore were merged and the Bangalore Municipal Corporation was formed (Gist 1957). However, the first organization to have any statutory authority was the Bangalore Planning Authority (BPA) which was established in 1952. Its jurisdiction was initially an area of 500 sq.kms. The BPA was responsible for the overall planning of the Bangalore Agglomeration area. (TCPO, 1988). The Bangalore City Municipal Corporation (BCC) was instituted in 1949 after the merger of the Cantonment and the Bangalore City Municipality.

### 2.3.4 History of Planning Organizations and Developments Plans, Bangalore

Year	Organization	Authority
1945	City Improvement Trust Board (CITB)	First planning agency
1949	Bangalore City Corporation (BCC)	
1952	Bangalore Planning Authority (BPA)	Statutory authority
1961	Bangalore Metropolitan Planning Board (BMPM)	Implement ODA
1976	Bangalore Development Authority (CITB + BPA)	Implement CDP
1986	Bangalore Metro. Regional Development Authority <sup>3</sup>	Bangalore Districts
1995	Bangalore Development Authority (BDA)	BDA limits
1995	Bangalore City Corporation (BCC)	City limits

Source: TCPO 1988

In 1961, the Bangalore Metropolitan Planning Board (BMPB) was constituted to formulate and implement the first master plan for Bangalore City. Next, the Bangalore Development Authority (BDA) was established in 1976 under the Bangalore Development Authority Act of 1976 combining the duties of the CITB and the BPA. The BDA was primarily instituted to implement the Comprehensive Development Plan (CDP 1980) and combine the activities of different service delivery organizations under one roof. The BDA is currently in charge of developing the outskirts of the city.

To understand present conditions in Bangalore, one must understand organizations that control development and pose major obstacles to urban development. The two main organizations in Bangalore that oversee urban development are:

- Bangalore City Corporation (BCC)
- Bangalore Development Authority (BDA)

---

<sup>3</sup> Bangalore Metropolitan Region Development Authority: BMRDA

Both the agencies have the common goal of providing a: *“healthy urban environment to enable the citizens of Bangalore to live in comfort and promoting the beauty of the city.”* (CDP 1995).

The BCC is involved primarily in the management of land and infrastructure within Bangalore’s metropolitan limits. The corporation limit is currently around 10-12 kilometers in radius. While BCC has jurisdiction over development in the metropolitan limits, the BDA surpasses the BCC in its authority to regulate growth in Bangalore. The BDA Act empowers the agency to issue directives to other authorities connected with development activities in Bangalore. Hence, the BCC has to perform its functions in conjunction with the BDA mandate (TCPO, 1988). Presently, BCC’s main goal is to provide sufficient land for basic services, recreation and civic amenities. Its second goal is to ensure that land is made available to the urban poor and to prevent the concentration of land with a few rich land owners.

The Master Plan or the Comprehensive Development Plan (CDP) has been the main instrument for controlling land use planning and development in Bangalore. The CDP demarcates various allowable land uses in different areas of the city. It earmarks specific areas for definite uses so that rational development of various land uses is possible (Parthasarathy 1988).

The public planning agencies are also responsible for providing urban services like water, electricity, transportation, sewage, and garbage disposal. However, with rapid growth, there is an increasing demand for urban services and land for commercial and

residential use in Bangalore. Lack of staff resources coupled with increased demand creates several inefficiencies and inequities in enforcing the provisions of the Comprehensive Development Plan (CDP). These inefficiencies and inequities result in increased incentives for violations of building by-laws and land use regulations as they restrict potential land development (Parthasarathy 1988).

Current land use plans ignore existing commercial and land markets in the city. Major transportation routes affect land use activity in their surrounding areas and these routes become mainly commercial or industrial that sometimes may be contrary to current zoning. Current zoning of land use does not make optimal use of areas with potential for commercial use and instead maintains a residential zoning of these areas. Many entrepreneurs, in fact are reluctant to move and relocate to zoned commercial areas as they are not perceived to be economically viable (TCPO 1988). This results in the conversion of open spaces and residential areas to commercial land uses. Mr. Reddy, Commissioner of Bangalore City, (1988) has remarked: *“In fact, most notable violations of zoning regulations in Bangalore are certainly not the much publicized high rise buildings. Hundreds of residential buildings have been converted for commercial purposes. This is a ubiquitous feature in Bangalore.”* (National Symposium on Planning and Development of Metropolitan Bangalore 1987 in TCPO 1988: 28).

A major task of the BCC is to regulate the construction and use of buildings. Zoning regulations and building bye-laws guide the Corporation in this purpose. Procedures to ensure compliance with regulations and bye-laws have not been streamlined

to ease access to land for building and housing (TCPO 1988). In addition to procedural processes, a maze of confusing laws governing land use in Bangalore hinders compliance (TCPO 1988: 46, Vagale 1988c).

The general procedure for construction approval is a long and tedious one. It starts with the design of a project plan by an authorized engineer or architect. The plan is then submitted to the planning authorities according to the jurisdiction in which the site is located. The proposed plan must be in accordance with the zone specified building codes in the Bangalore City Bye-laws. Plans submitted for approval to the BDA and the BCC are always in compliance with all regulations on paper (Mr. Narasimha Murthy, Mr. Vimal Narayan, Mr. Girish, Mr. Prasanna, Mr. Sadasivam 1995).

The process of plan approval is a long and bureaucratic one that has real consequences for the developers and reduces returns on their investment. Moreover, delays and red-tape have transaction and opportunity costs for the builders. Bribes are offered to authorities at this stage to hasten the process of building approval and not to obtain approvals for obvious violations (Sannapaiah 1994, Mr. Narasimha Murthy 1995). Rather, it is during actual construction that citizens will violate building regulations. Building inspections, when enforced, are selective --violations of building regulations can be overlooked if the inspector is bribed. If the inspecting official is not bribed during building inspection, the regulation is enforced strictly (interviews with Mr. Vimal Narayan, Mr. Narasimha Murthy, Mr. Girish, Mr. Sadasivam, Mr. Prasanna, 1995). Although fines and sanctions can be enforced against the citizens transgressing regulations, they are not

enforced strictly due to delays and administrative inefficiencies. Moreover, the judicial system in India that handles land disputes is also inefficient and subject to political manipulation (Wade 1984). Therefore, offering bribes to building inspectors minimizes the risk of fines and a lengthy and expensive legal battle with city planning authorities.

Interviews with architects and public planners in Bangalore confirmed that institutional inefficiencies are common to the BDA and the BCC. They corroborated the notion that public planning offices in Bangalore are grossly inefficient due to lack of staff, inequities in land resource distribution, and rampant bribery and corruption that undermined the organizational objectives (interviews with Mr. Vimal Narayan, Mr. Narasimha Murthy, Mr. Vagale, Mr. Radha Krishna, Mr. Murthy, Mr. Krishna Murthy, Mr. Girish, Mr. Sadasivam, Mr. Prasanna, July, 1995). If citizens have the resources and the power to by-pass the system, they bribed officials to speed approval and to overlook violations during inspections. If citizens do not possess either the monetary resources or the political influence to get favorable decisions, they simply ignore imposed regulations in the hope that they will go undetected. Most of the interviewees felt that existing regulations were only useful as a supplementary source of income from bribes for underpaid public planning officials in Bangalore.

## **2.4 RELEVANCE OF LITERATURE TO RESEARCH**

In developing countries, land development controls play an important role in structuring cities. Prior research has concentrated on explaining reasons for the

inapplicability of development regulations (Mehta et.al 1989, Dowall 1992, Sannapaiah 1994, Njoh 1995). The research also suggests different strategies to modify institutional and regulatory aspects of land use and building controls in developing cities. They suggest that relaxing regulations and understanding economic, cultural, and institutional contexts are important considerations while formulating new land development regulations.

A combination of lack of applicability and institutional problems have exacerbated the incidence of regulatory non-compliance in developing countries and India in particular. Numerous development plans and planning agencies are responsible for urban development in Bangalore. The provisions of the plans are highly inapplicable given the economic, socio-cultural situation in Bangalore. Moreover, the institutions in charge of regulating growth are also characterized by centralization, fragmentation, and bureaucratic inefficiencies. All these factors facilitate, if not encourage non-compliance to urban regulation in Bangalore.

### **3. RESEARCH CONTEXT**

Bangalore, the case study site is located in southern India and has been the administrative capital of Karnataka State since 1956. It is one of India's largest cities and chief industrial centers. Its population according to the 1991 census of India was 4.16 million and is projected to be between 7 and 8 million by the year 2000 (BDA 1995). Located on the relatively flat Deccan Plateau at an elevation of 949 m (3113 ft), Bangalore has a salubrious climate. With lush gardens and parks in the heart of the city, it is India's 'Garden City' (Encarta 1996).

Since 1947, Bangalore has been a major transportation and manufacturing center. Industries produce communications equipment, machine tools, aircraft, electric motors, printed materials, textiles, footwear, and timepieces. The city has developed as a computer software production center that is home to more than 100 software and hardware companies since the late 1970s. Bangalore is now South Asia's Silicon Valley and is currently the base of India's space program (Encarta 1996).

As in any growing city of a developing country, authorities in Bangalore are trying to distribute a limited amount of resources to a rapidly growing population. Traffic conditions and provision of infrastructure are already becoming highly debated issues in the city. Several satellite towns around Bangalore, which were intended to alleviate congestion in the city, have not been entirely successful. A growing number of people commute from these satellite towns to work in the city every day and overburden the

existing transit system. Two-wheelers like scooters and bikes are another source of traffic congestion due to their affordability and the unreliable public transport.

Demand for land and services in Bangalore increases exponentially. Master plans and comprehensive development plans that focus only on physical development of the city have not been able to cope with present urban problems. An urgent need for integrated and holistic approaches to the planning of urban land and services exists.

### **3.1 HISTORY OF BANGALORE'S GROWTH**

Bangalore grew around a fort established in 1537 by Kempegowda who is credited with being the founder of Bangalore. The British established their barracks here in 1809 and Bangalore became a British administrative center from 1831 to 1881, after which the Maharaja of Mysore gained possession of it (Gist 1957). During the period between 1809 and the late 1940's, the city had two separate administrative units: Bangalore City on the West, and the military Cantonment<sup>1</sup> on the east side that was under British jurisdiction (Gist 1957). Restrictions on the location of residential or commercial land uses did not exist at this time. Large parks established in the city center during the late 1800s were products of British municipal planning (Gist 1957). The city grew from two main commercial nuclei, each of which catered to specific populations. One is the City Market and its surroundings, and the other is the City Cantonment area. The City Market was the center for Bangalore City, and the Cantonment catered to the British military elite (Gist

---

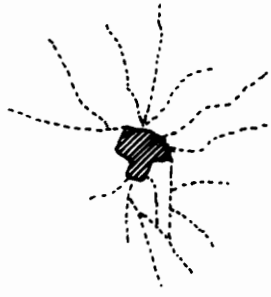
<sup>1</sup> Cantonment: Colonial British military base and surrounding areas.

1957). Thus, Bangalore's structure has been influenced by its historic dual administrative arrangement.

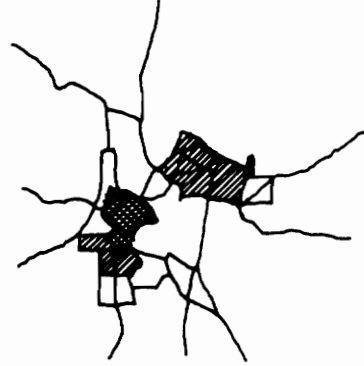
Other social factors have been responsible for the structural development of the city. Initial residential development was on the basis of religion and caste preferences and prejudices. As in traditional Indian cities, higher castes were more densely populated in the central part of Bangalore, and the lower castes were predominant on the outskirts. However, with the city's rapid development and the steep rise in real estate prices, newer layouts reduced class segregation drastically.

After India's independence in 1947, the government merged the two distinct development units and formed the Bangalore Municipal Corporation (Gist 1957). Bangalore had limited scope and extent for planning until its independence. During the 1940s and 1950s, change in the city's development structure stemmed from the introduction of large scale industries. The first few industries were textile mills, tobacco factories, brick and tile works, and a government soap factory (Gist 1957). Industrial development picked up during the 1960s and electronics and machinery were the main industries in the 1970s and 1980s. Presently, computer and software manufacturing have replaced industrial development in Bangalore.

The city's physical growth until the early 1980s had three distinct phases (Map 3.1.1). The starting points were the distinct nuclei that characterized a dual city. In the first phase, residential development sprang up around the two nuclei for about 3 - 6 kms. The second phase was the development of large scale industrial complexes at about 9 - 12



1537



1862



1949



1972



Map 3.1.1 Bangalore's Physical Growth

Source: Bangalore City CDP, 1995

kms. from the city centers. The construction of educational campuses at about 20 - 25 kms from the city center characterized the third phase. The areas in between all these developments was infilled with residential and smaller commercial centers over time (Gist 1957).

The city and environs have spread from its initial area of 18.1 sq. miles in 1889 (Rao and Tewari 1986: 228) to about 200 sq. miles today (about 100 of which are in the city limits). The main determinants on the pattern of growth after independence were axial transportation routes, proximity to places of work and services, and preferences for residential and industrial locations near the outward moving city edge.

Bangalore has a core and periphery structure (Rao and Tewari 1986: 230). The core consists of the two commercial foci and the administrative center. The peripheral area includes all the census areas at the edge of the corporation boundary. Density of residential housing decreases from the core to the periphery (Rao and Tewari 1986: 232). The city has had one of the highest growth rates in India in recent years. It grew at an annual rate of 7.65 percent during 1971-81 and 4.04 percent during 1981-91 (Table 3.1.1 and Figure 3.1.1) compared to other major cities like Bombay, New Delhi, or Madras.

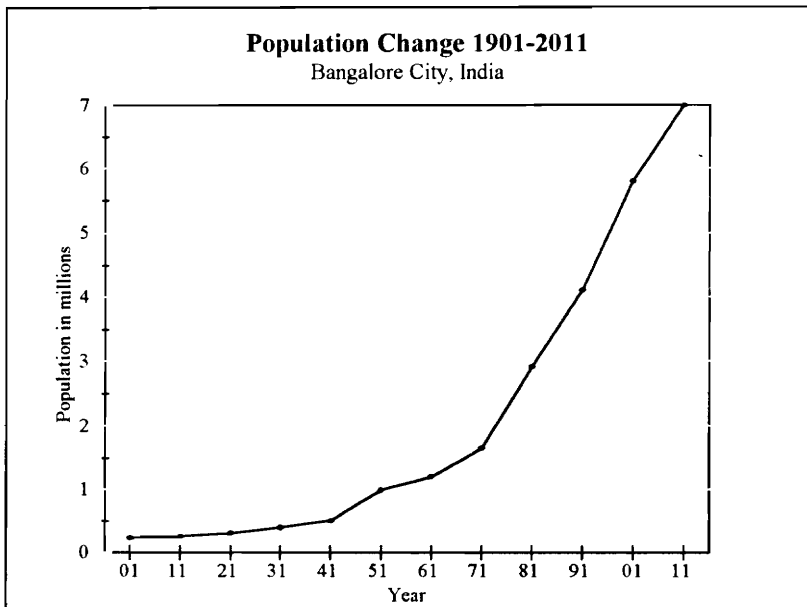
During the post independence period, planning institutions and development plans for the city influenced the growth of the city. Presently, several public planning agencies and urban regulations control urban development in Bangalore. However, most of these regulations are not effective in guiding and controlling urban growth because of the lack of applicability of regulations and institutional inefficiencies.

*Table 3.1.1 Annual Growth of Population  
In Bangalore City Metropolitan Area.*

Year	Population of metro area (millions)	Annual growth rate
1901	0.23	1.55
1911	0.26	1.45
1921	0.31	1.92
1931	0.40	2.75
1941	0.51	2.89
1951	0.99	9.40
1961	1.21	2.14
1971	1.65	3.70
1981	2.91	7.67
1991	4.16	4.03
2001	5.80	4.20*
2011	7.00	2.07*

Source: Bangalore Comprehensive Development Plan, BDA 1995.

*Figure 3.1.1 Population Change*



Source: Bangalore Comprehensive Development Plan, BDA 1995.

\* Projected numbers

## 4. Research Methodology

From the theoretical context, I hypothesize that the incidence of regulatory non-compliance may be high because of a lack of applicability for the following reasons:

- The land market suggests that the economic benefits of violating regulations are greater than either the benefits of complying with regulations or the costs of detection.
- Complying with regulations is expensive due to high regulatory standards and complying also hinders development.
- Violating regulations increases cultural and religious identity for citizens

These are necessary pre-requisites for regulatory non-compliance. If the institutional structure is rigid and strict, urban regulations would be enforced regardless of their inapplicability. Institutional inefficiencies result in lack of enforcement which enables non-compliance behavior to prevail. Thus, both conditions have to be satisfied for regulatory non-compliance to be widespread.

Previous studies have focused on either the inapplicability of urban regulation or institutional inefficiencies. Little research examines non-compliance as a function of the interaction of inapplicability and institutional factors. Analyzing particular violations of building and land use regulations with respect to their applicability and institutional issues will inform policy makers in developing countries how to improve the entire system of development controls.

This research sets out to determine the extent of compliance with building and land use laws in the city of Bangalore. About 0.2 million unauthorized constructions occurred in and around Bangalore city in 1988 (TCPO 1988). This research examines a small

number of the violations in a residential area in Bangalore, India. The violations are interpreted from the framework presented earlier.

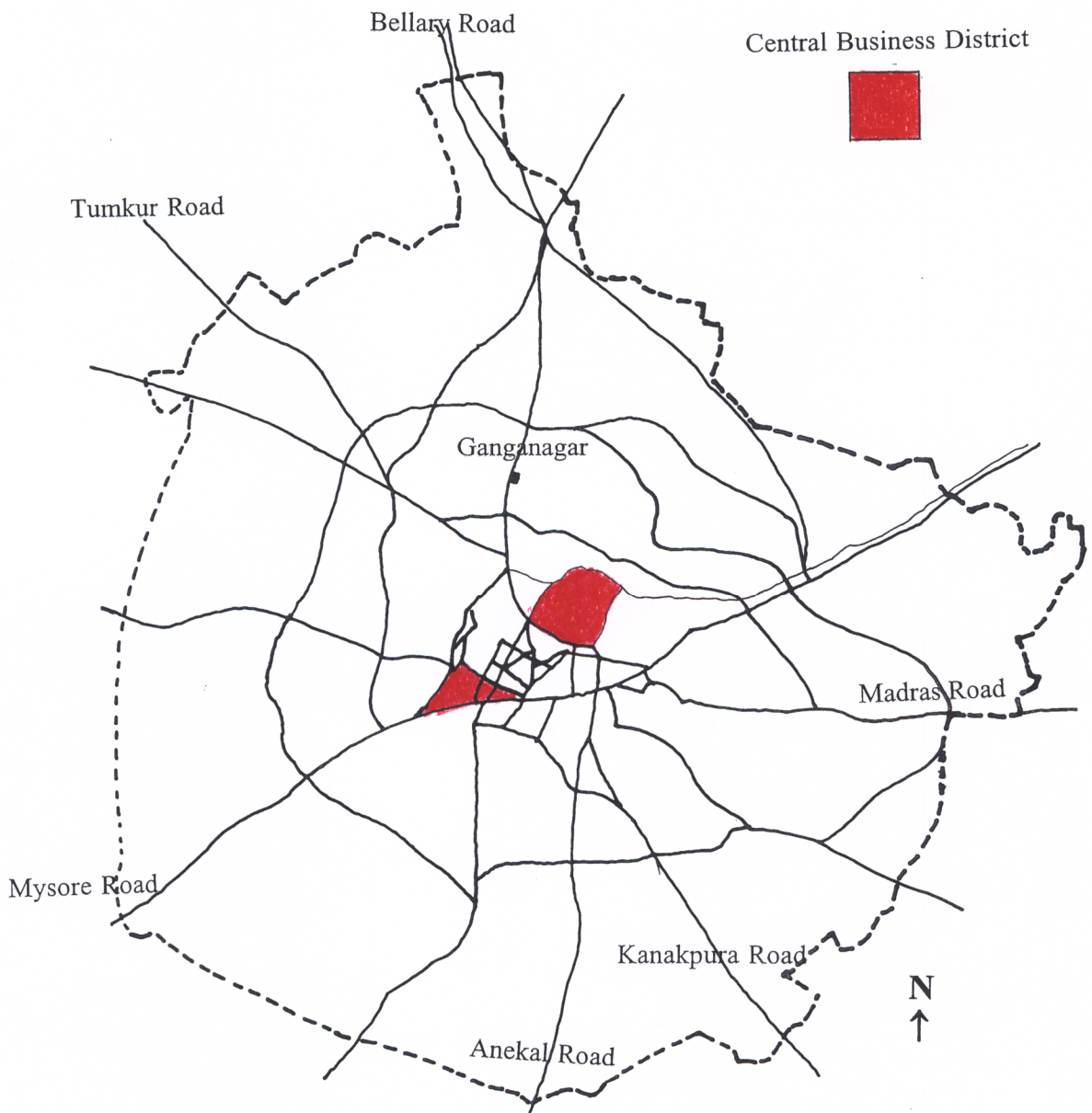
#### 4.1 CASE STUDY NEIGHBORHOOD

The city of Bangalore is currently divided into fifty-five different planning districts. A middle to low-income which was no more than twenty years old was adopted for this research. The planning regulations and zoning laws for the neighborhood were first adopted under a comprehensive development plan of Bangalore city in 1972 when the Outline Development Plan (ODP) was approved. The comprehensive development plan laid down proposed land uses for each of these planning districts. The study neighborhood is located in planning district number six. The zoned land use distribution according to the 1984 CDP for planning district six is primarily residential connected with transportation networks (Table 4.1.1).

*Table 4.1.1 Proposed Distribution of Land Use in 1984.*

Land Use	Area in Hectares	% of total area
Residential	766.67	42.12
Commercial	35.00	1.92
Industrial	45.89	2.52
Parks and open space	252.38	13.86
Public/ semi public	103.32	5.67
Transportation	424.2	23.3
Unclassified	192.7	10.61
Total developed area	1820.16	100
Greenbelt	30	
Total Area	1850.16	

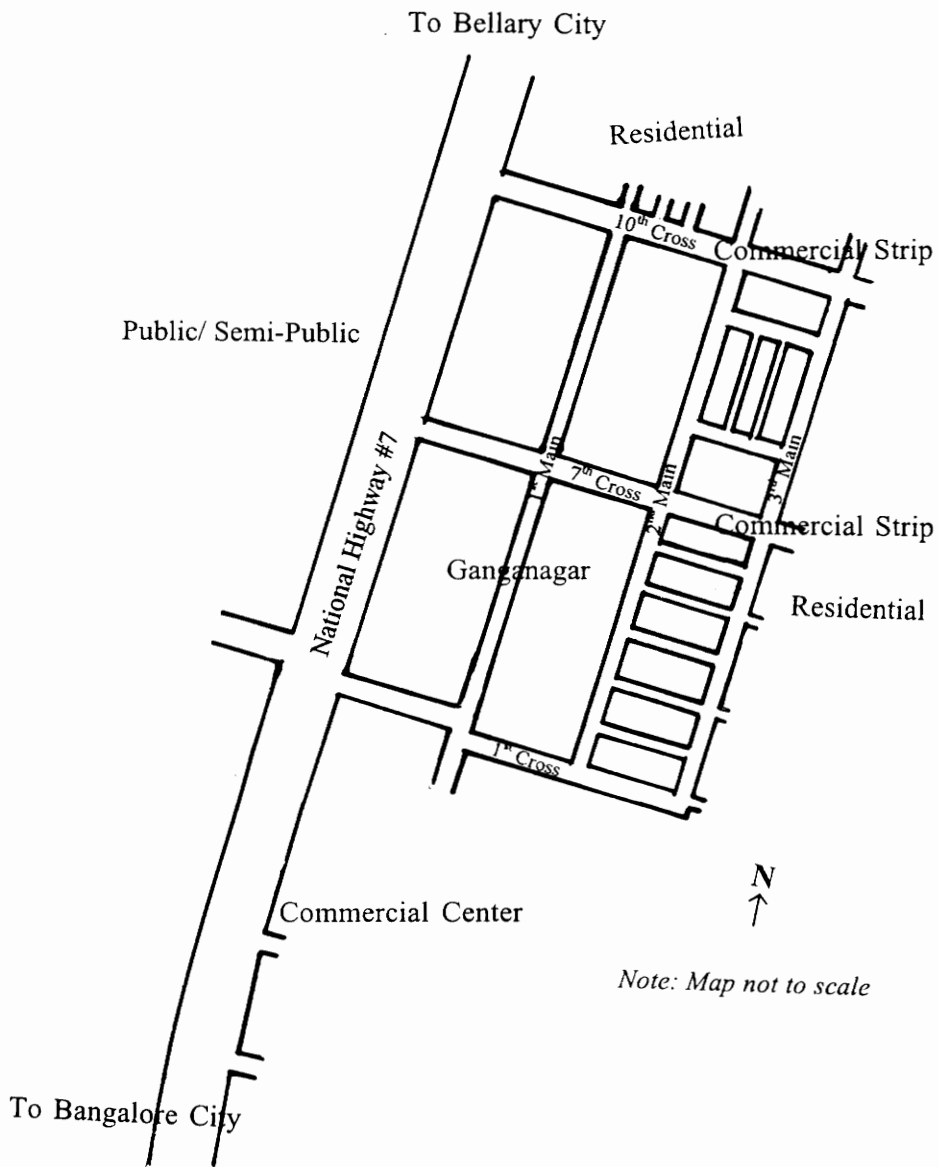
*Source: CDP 1984 (Planning District #6).*



*Map 4.1.1 Location of Ganganagar*

0 1.5 4.5 10.5 kms

Source: Bangalore City CDP, 1995



Map 4.1.2 Ganganagar

Source: Bangalore City CDP, 1995

The study area is about twenty-seven acres situated in the north of Bangalore (Map 4.1.1 and Map 4.1.2). Its official name is Ganganagar Layout (hereafter referred to as Ganganagar). Ganganagar is a mixed neighborhood with different castes, religions, and socio-economic background. Topographically, the area is almost flat with a slight slope towards the north. It is roughly a rectangular area that is bounded on the west by National Highway Seven, on north and south by commercial strips, and on the other side by residential areas. Strip development along the highway acts as a local commercial center. The area itself consists of three main roads (running N-S) and ten cross roads (running E-W). The 7th and the 10th cross roads also have commercial strip development. The rest of the area is predominantly residential but with some mixed land use (residential and commercial).

Ganganagar has a relatively high population density of 200 persons per acre. An area in the intensively developed area in the city center has population densities of about 250 persons per acre. For comparison, another middle class residential neighborhood in Bangalore has a population density of around 180 persons per acre.

Most of the residential and commercial development in the area took place during the 1980s. The plot sizes range from 30'X40' plots to 60'X40' plots. The street right-of-ways range from 50' to 30'. Though there was some construction activity in the early 1970s, most of the development took place during the late 1970s and early 1980s. Commercial development accelerated during the late 1980s and is still high.

As mentioned previously, the Comprehensive Development Plan (CDP) was revised in early 1995. However, the area under study was developed according to the earlier CDP (1984 and 1971). So, for the purposes of this research, the CDP of 1984 is the regulatory standard for zoning and land use controls.

## **4.2 EXISTING REGULATIONS**

The city was divided into the following areas for the purpose of regulating residential and commercial buildings only:

Area A - Intensively populated area

Area B - Central Administrative area and its surroundings.

Area C - All other areas other than the areas comprised in A and B.

Ganganagar lies in Zone C of the CDP (1971 and 1985). Zone C denotes the sparsely developed areas in Bangalore city. Building and land use regulations are in the General Building Requirement Section of the Bangalore City Bye-Laws, 1984 and 1971, part II: 27-34\* and are outlined in detail in Appendix II.

The regulations analyzed were:

1. Size of plot (min. 100 sq.meters) for residential use.
2. Land use zone (proposed and existing).
3. Set back requirements for residential, commercial, and public buildings.
4. Number of floors / height of buildings
5. Plot Coverage
6. FAR
7. No construction in the set back area.
8. Position of garage.

---

\* Glossary of terms used provided in Appendix II

### 4.3 METHODS

A total of 221 plots in Ganganagar were analyzed (Table 4.3.1). Current land use and building condition were obtained through an observational field survey supplemented by slide photographs. A complete census of building and land use violations was obtained for Ganganagar.

*Table 4.3.1 Distribution of Zoned Land Use  
Ganganagar, Bangalore*

Zoned Land Use	Number of Plots
Residential	184
Commercial	34
Public/semi-public	3
Total	221

*Source: CDP 1980: Planning District #6*

The area selected for study was about twenty seven acres and all plots were accessible on foot. Since a complete inventory was feasible, violations on all plots were included in the study. Existing building and land use conditions in the neighborhood were observed and recorded on a base map. This information was then compared to the building and land use requirements for each parcel. Data collection employed a simple table with plot numbers in rows and the land use and building variables in columns (Appendix I). The researcher was assisted by three practicing architects during data collection. They collected data on all the building and land use variables independently and were averaged with my estimates. Data collection proceeded from the three main roads to the ten cross roads, advancing plot by plot. The parcel units were obtained from the base map of the neighborhood in Ganganagar provided by the BDA. The researcher

recorded any changes in plot lines on the BDA base map. The data from the field survey instrument was coded along with the regulatory data and recorded on a spreadsheet. Two hundred and twenty one plots were recorded in this manner.

Data collection on illegal behavior is an inherent problem because its admission may result in future negative sanctions. Rather than trying to obtain information from public planning officials or architects on the occurrence of non-compliant behavior, I measured the visual violations. Several problems arose in the data collection phase which necessitated several assumptions.

First, any violations involving a distance parameter could not be measured directly by my survey approach. I had to respect private property rights and the reluctance of plot owners to let me measure variables directly. In order to measure the variables as accurately as circumstances would allow, I used estimates from three architects to ensure reliability and validity. I also carefully examined slide photographs of sample plots to spot check the reliability of the measures.

Estimates of distances varied between the three architects from 0.5 feet to 1.5 feet. So the maximum interval error for any distance estimate is assumed as  $\pm 1.5$  feet. In an effort to minimize this error, I overestimated set backs, and underestimated FAR, plot coverage, building heights, and land use, garage and set back construction violations. The result is targeted at a more conservative estimate of violations.

Vacant plots or those under construction were not considered in the data analysis. Several plots lacked data on set backs, heights, FAR, and plot coverage though data on

land use for the same plots was available. Plots which had data only on land use were used in the analysis of land use violations but were not considered in the other analyses. Again, this led to a more conservative estimate of building and land use violations.

Typically, in Ganganagar, about 75 percent of all buildings of two stories or higher did not construct the total allowed floor area on the last constructed floor. For this reason, only 50 percent of the square footage in the highest floor was used in making floor area ratio (FAR) calculations. Also, 20 percent of the ground floor area was assumed to be porch, stair case, and overhang area and was not considered for analysis. This underestimates FAR values and gives a more conservative result. No buildings violated height requirements, so height was only important in the calculation of FAR conditions. It was assumed that each floor in a building measures 10' in height and an extra 2'-3' is added for plinth\* height. No distinction was made between buildings with sloping roofs and those with flat roofs.

#### **4.4 MEASURES**

Information was obtained for 221 plots and no information was collected for plots that were either not developed or government owned plots. The unit of analysis for all the measured variables was the plot. The following data sources and measurement procedures for each variable were as follows:

---

\*<sup>1</sup> Plinth: is the distance through which the foundation of the building is raised from ground level.

#### 4.4.1 Data measurement for specified regulations

- Size of plot: The base map and the CDP (1984) obtained from the BDA provided information about the subdivision layout of Ganganagar. Although a minimum plot area requirement exists in the Bye-law, plot area violations were not analyzed. However, plot size is needed in calculating other variables and hence was measured.
- Land Use (proposed and existing): The map of the planning district number six, (CDP 1984) prescribed definite land uses for the case study area. Data derived from field surveys were cross-checked with slide photographs.
- Set back requirements and existing set backs for buildings: Plot sizes and location zones determine the front, rear, and side set backs for residential, commercial, and public/semi-public buildings in Bangalore City Bye-laws (1983: 29-30, Appendix III). Existing set backs were then estimated through field surveys and slide photographs of the area.
- Number of floors / height of buildings: Number of floors allowed depends on the location zone and land use requirements of a particular plot as given by the Bangalore City Bye-laws (1983: 32-37, Appendix III) for residential, commercial, and public/semi-public buildings in Zone C. Field surveys and slide photographs were used to estimate existing number of floors and corresponding heights for buildings.
- Plot Coverage (required and existing): The Bangalore City Bye-law (1983: 32-37, Appendix III) specified plot coverage that depended on plot area, and permitted land uses. Plot coverage is percent area of the plot area that is built upon. Plot

coverage could not be directly measured by the field survey, and was calculated using the set back data for each of the plots.

- FAR (Floor Area Ratio): The Bangalore City Bye-laws (1983: 32-37, Appendix III) specified FAR requirements for different plot sizes, and uses of buildings. FAR could not be directly measured through field surveys and was calculated for each plot depending on the ground floor area coverage and the existing number of floors.
- Construction in the set back area: Building regulations (Bangalore City Bye-laws 1983: 30-31, Appendix III), do not allow construction in the set back area. Construction included any structure temporary or permanent, illegal overhangs from first floor balconies, open staircases, or any unauthorized enclosures and barricades. Non-compliance was measured by field surveys and triangulated using slide photographs.
- Position of garage: Regulations in Bangalore City specified number and required positions of garages for different plots (Bangalore City Bye-laws 1983: 31, Appendix III) depending on plot size, and location of plot in the subdivision. Corner had different garage requirements that specified that garages had to be located in the corner of the site that was diagonally opposite to the road junction. Field surveys triangulated by slide photographs provided data measuring non-compliance.

Data for set backs, heights, plot dimensions, and road widths were measured in units of feet and inches. Even though India has adopted the metric system, the foot

system for measuring distances is more popular among architects, builders, and citizens. Land use categories were residential, commercial, industrial, public/semi-public, or open spaces. Plot area and building area were measured in square feet. FAR was calculated as a ratio and plot coverage was a percentage.

For each regulation, i.e., set back, FAR, and others, each plot was classified as whether it was in compliance or was a violation. Violations of land use and building requirements were analyzed with respect to their plot sizes (Table 4.4.1). Plot size acted as a surrogate measure for income ranges of citizens of the area. This was based on the assumption that larger plots were owned by higher-income groups as opposed to smaller plots that were owned by lower-income groups. Violations of building requirements were also analyzed according to their zoned land use. This tested whether zoned land use influenced citizen's behavior and whether commercially zoned plots had a higher incidence rate of violations.

*Table 4.4.1 Distribution of Plot Size Categories  
Ganganagar, Bangalore*

Plot Size Range*	Number of Plots
< 1,500 sq. ft.	50
1,501 sq. ft- 2,000 sq. ft.	14
2,001 sq. ft- 2,500 sq. ft.	110
2,501 sq. ft.- 5,000 sq. ft.	41
> 5,000 sq. ft.	6

*Source: Ganganagar Base Map BDA 1985.*

---

\* Plot size ranges are narrower than prescribed by the Bangalore City Bye-Laws to increase analytical capabilities.

## 5. DATA ANALYSIS

### 5.1 VIOLATIONS OF LAND USE REGULATIONS

Observed and zoned land use categories were cross tabulated to identify the number of violations (Table 5.1). Violations involving conversions to commercial use constituted the largest number (29 plots) and the highest percent (13.5% of all 221 plots) of all land use violations. The tendency to convert other zoned uses to commercial land use seems to confirm that economic motivations were at play and that current zoning was not applicable to the objectives of the residents.

*Table 5.1 Distribution of land use violations.  
Ganganagar, Bangalore.*

Zoned Land Use	Residential Number	Commercial Number	Public/Semi Number	Total Number
Observed Land Use	% Zoned	% Zoned	% Zoned	Observed
Residential	126 69%	1 3%	0 0	127
Commercial	9 5%	24 70.5%	1 33%	34
Industrial	4 2%	4 11.5%	0 0	8
Public/semi-public	2 1%	0 0	2 67%	4
Vacant/Under construction	24 13%	3 9%	0 0	27
Residential with Commercial	19 10%	0 0	0 0	19
Commercial with Residential	0 0	2 6%	0 0	2
Total (% Zoned)	184 (100%)	34 (100%)	3 (100%)	221

Since even cursory inspections can detect most of the land use violations, one can speculate that bribing or some other means of securing approval is being used. The economic gain accrued by illegal commercial uses would certainly constitute a motive, and the added revenues would provide the means to circumvent the land use regulations.

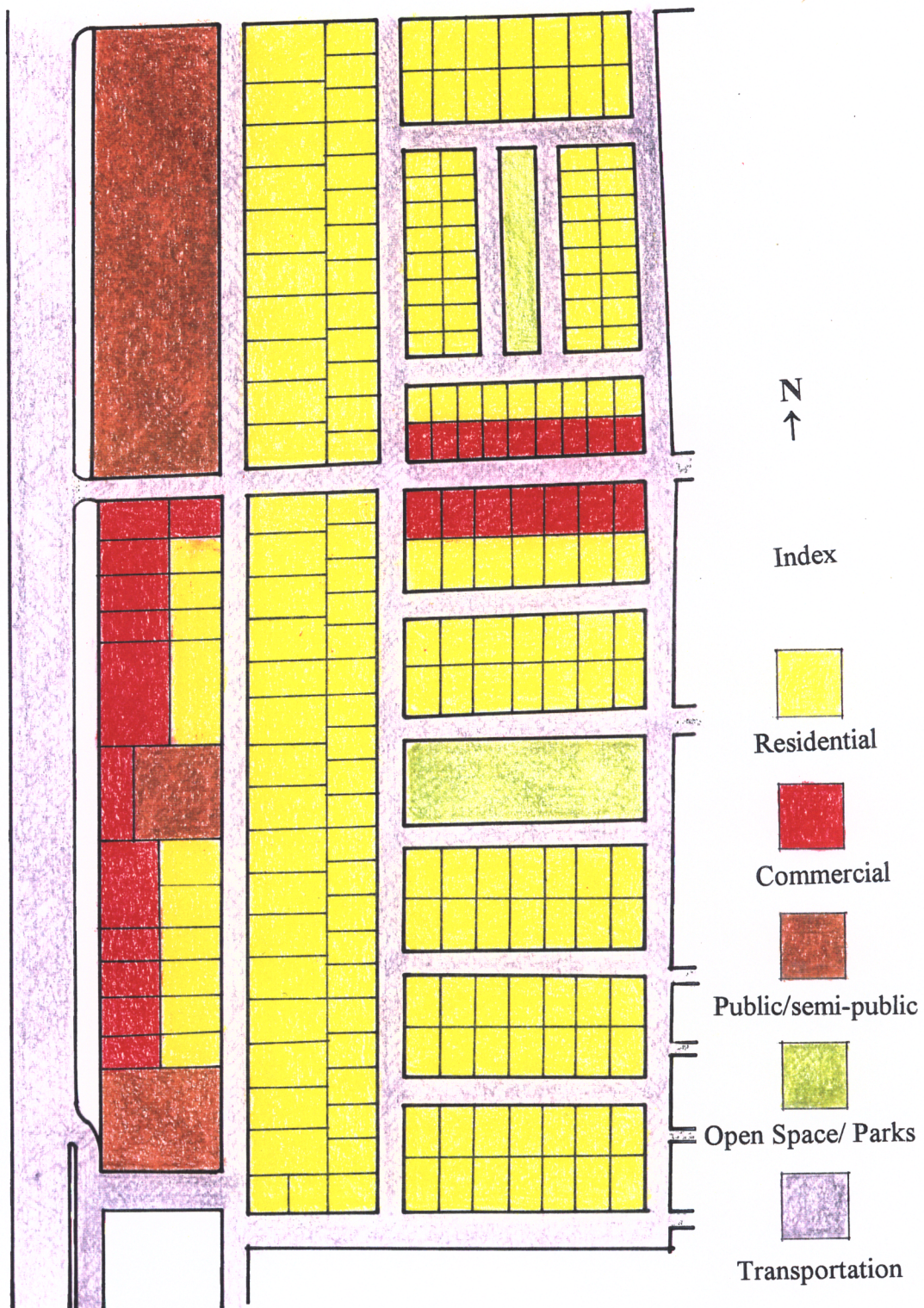
Bangalore City Bye-laws have limited flexibility in prescribing land use. The study area had a low percentage (34 plots or 15.5 percent) of plots zoned commercial as compared to traditional mixing of land uses in Indian cities where the percentage may be as high as fifty percent (Sannapaiah 1994: 115). Violations of land use from residential to commercial land use may compensate for low availability of commercial land in Bangalore. Even though the study area is predominantly residential, pedestrian accessible commercial use is essential for a viable residential area in Bangalore.

#### 5.1.1 Location and Market Relationships

The incentive for developing more commercial uses than is currently zoned is also affected by the area's location with respect to other commercial markets. Ganganagar occupies an important position along National Highway number seven that leads to Bellary city\*. Because it is located on a major commuter route in the city, populations from other local areas pass through the area on a regular basis. This increases the demand for commercial land in areas along highways. The location of illegal commercial plots demonstrates local responses to this locational advantage of the area. Most of the land use violations occurred along the main roads and near the commercial strips at the north

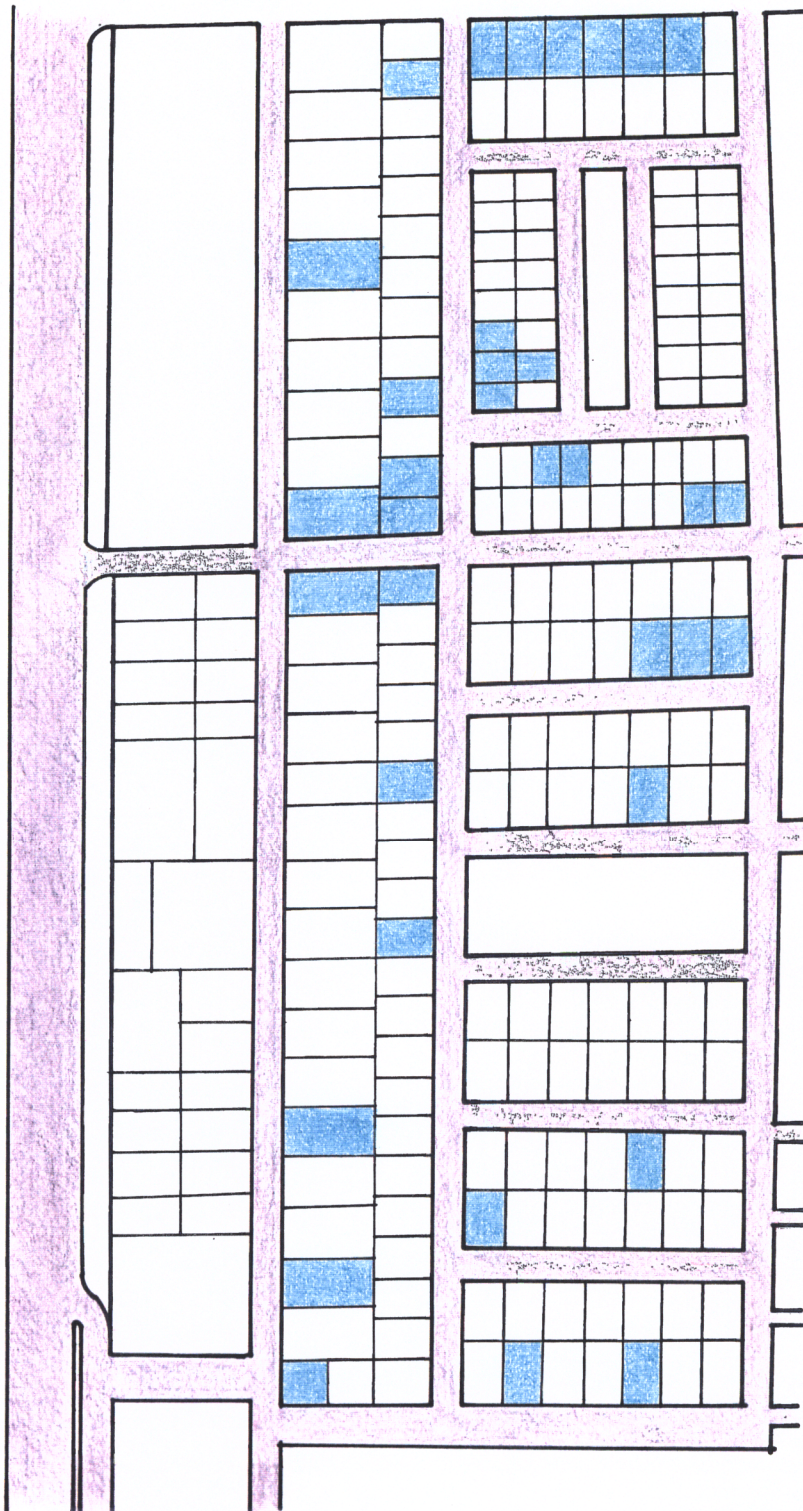
---

\* Bellary: A city located north of Bangalore



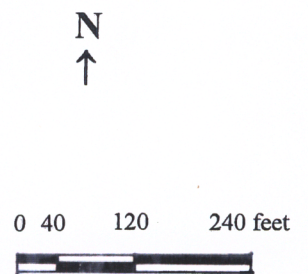
*Map 5.1 Location of zoned land use, Ganganagar.*

Source: Bangalore City CDP, 1995



*Map 5.2 Location of land use violations, Ganganagar.*

Source: Bangalore City CDP, 1995



and south edges (Map 5.1 and Map 5.2). The 7th cross road is also a commercial strip, and a cluster of land use violations existed along its routes. Small convenience shops, private libraries, specialized clinics, restaurants, book stores, medical stores, and other specialized stores are found on the illegal commercial parcels. These uses benefit from locations in established commercial zones that attract clientele because of pedestrian and vehicular traffic and gain greater economic returns.

The cost of commercially zoned land relative to other zoned uses also provides a strong incentive for violating zoning regulations. The average square foot cost of commercially zoned land in Ganganagar is around Rs.1,200 and that of residential land is Rs.800. Thus, it makes economic sense to buy a residential plot at a lower cost and convert it to commercial land use and increase the return on one's investment. Also, since commercial land values are higher than residential plots in the same area, violating land use regulations makes good long term economic sense as long as enforcement is not a threat.

These findings confirm Dowall's (1992: 19) observation that urban land and economic markets in developing countries influence compliance with land use regulations. If regulations result in less profitable development, i.e., they do not make use of the market potential of urban land, violations of land use regulations occur (Bhattacharya 1990: 84, Turner 1985: 154, Dowall 1992: 15).

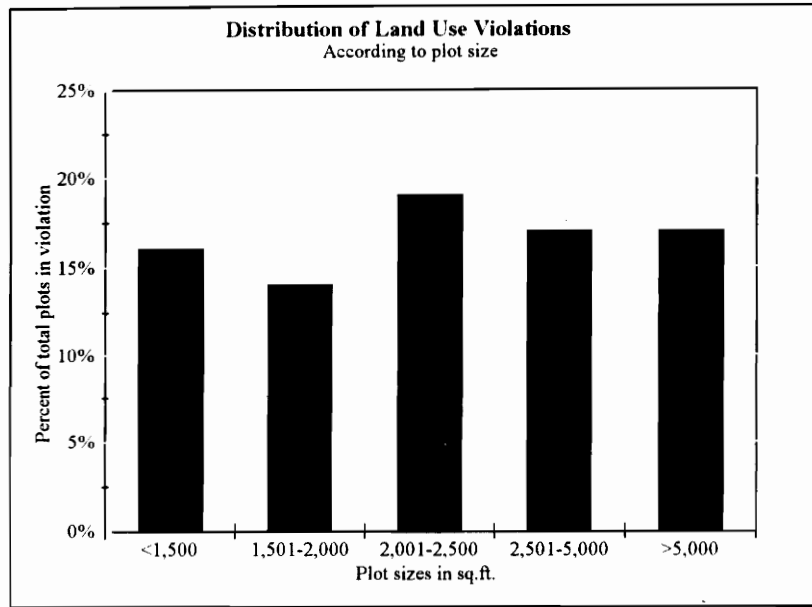
Two plots (1.0 percent) that were zoned commercial but were actually in mixed commercial and residential use. While this seems to refute an economic interpretation of

violations, closer inspection of the two plots suggests not. Both had commercial activity on the ground floor and residential uses on all the other floors. Retail commercial activities in Bangalore are usually at ground floor level with offices on the upper levels because most commercial activity is pedestrian oriented. Hence, if upper floors do not have any office activity, conversion to residential uses is an option. These types of conversions not only mitigate the work-residence separation effect of zoned land use, they also increase the efficiency of zoned land use by providing more functions in an otherwise single use plot (Njoh 1995: 347).

### 5.1.2 Plot Size Effects

Land use conversions were analyzed to determine whether plot size was associated with land use zone violations. If the assumption that plot size is a surrogate for income is correct, we might expect residents on smaller plots to supplement their income by converting a portion of their plot to commercial use. No apparent relationship between plot size and land use violations existed (Figure 5.1.2). Thus, the analysis did not establish any income associations with land use as suggested by Mehta et.al (1989), Njoh (1995), Dowall (1992), and Sannapaiah (1994).

Land use violations were also analyzed to identify any associations between plot sizes and location of plots. Larger lots on main roads could be prime locations for commercial use. On analyzing their location (Map 5.2), no relationship between land use violations, location, and plot size could be identified.



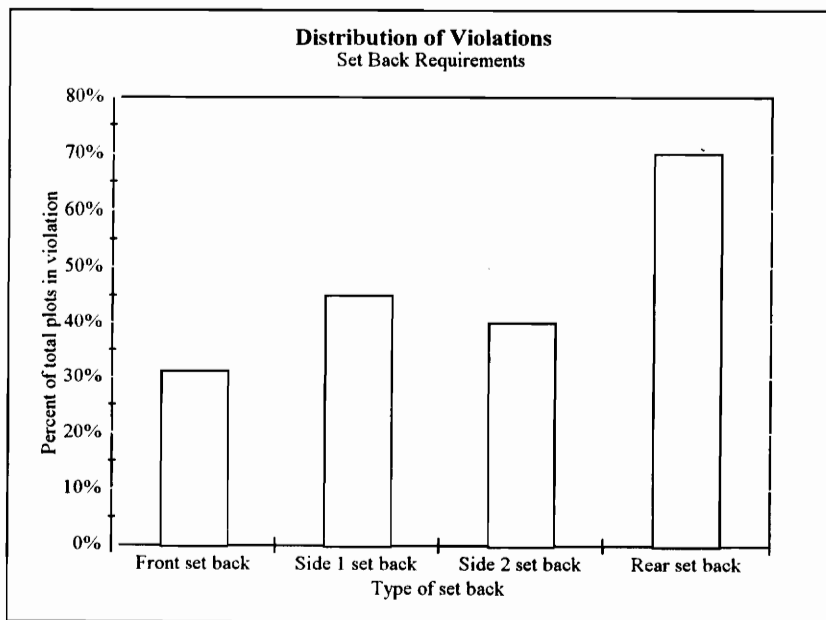
*Figure 5.1.2 Distribution of land use violations according to plot size.*

## 5.2 VIOLATIONS OF SET BACK REGULATIONS

Of the 221 plots in the study area, 157 plots (71 percent of the plots) violated at least one of the four set backs. Violations of set back requirements included any area of the building or temporary construction that encroached the area allowed for set backs. Illegal structures in the set back area like porches, staircases, and porticoes were not considered in measuring set back requirements. Sixteen plots (8.5 percent) violated all the four set backs. These findings supported information gathered from interviews with public planning officials who stated that set backs were among the most violated regulations (interviews with Mr. Vagale, Mr. Girish, Mr. Radha Krishna et.al. --architects, Mr. Krishna Murthy, and Mr. Narasimha Murthy, et.al.--planners, Bangalore, July, 1995).

Set back regulations are more difficult to enforce due to the time needed to inspect and the fact that they cannot be easily measured from the street. Thus it is relatively less risky for citizens to ignore set back requirements in the development of the plot. Rear set back violations showed a higher frequency than any other set backs (Figure 5.2.1). Over twice as many rear set back violations were observed as compared to front set backs. Generally, the rear of any building contained utility areas and citizens seem to consider rear set back requirements as a waste of space. The combination of its reduced visibility and lack of useful function would seem to explain the prevalence of violations of rear set back requirements.

The violations of other set backs were apparently in response to other factors than those for rear set backs. Side and front set backs have specific functions which may



*Figure 5.2.1 Distribution of set back violations*

account for their lower incidence rate as compared to rear set back violations. One of the side set backs typically is the driveway and the other creates a passage to the rear of the site. Front set back areas are designed to allow small gardens or play areas for children and are thought to play an important aesthetic role in enhancing available open space. Also, front set backs have a higher visibility. Thus, the lower incidence rates of front and side set backs may be related to their clearer functional role and to their higher visibility.

### 5.2.1 Land Use Effects

Violations of set back regulations were analyzed to determine whether an association existed between set back violations and zoned land use. Since, commercial land in Ganganagar is more expensive than residential land, its higher cost may induce commercial builders to increase usable built area in the plot. Economic benefits can be gained from increased floor space that is rented out for commercial use. Encroaching set back requirements increases usable floor area and thus increases floor area ratio values. Analysis showed that the occurrence of violations of set back regulations was higher in commercial plots. Twenty eight plots (82 percent) of the thirty four commercial plots were in violation of at least one set back requirement, while sixty six percent of the residential plots were in violation of at least one set back requirement. Although violating set back requirements increased benefits for residential owners, commercial set back violations were more prevalent.

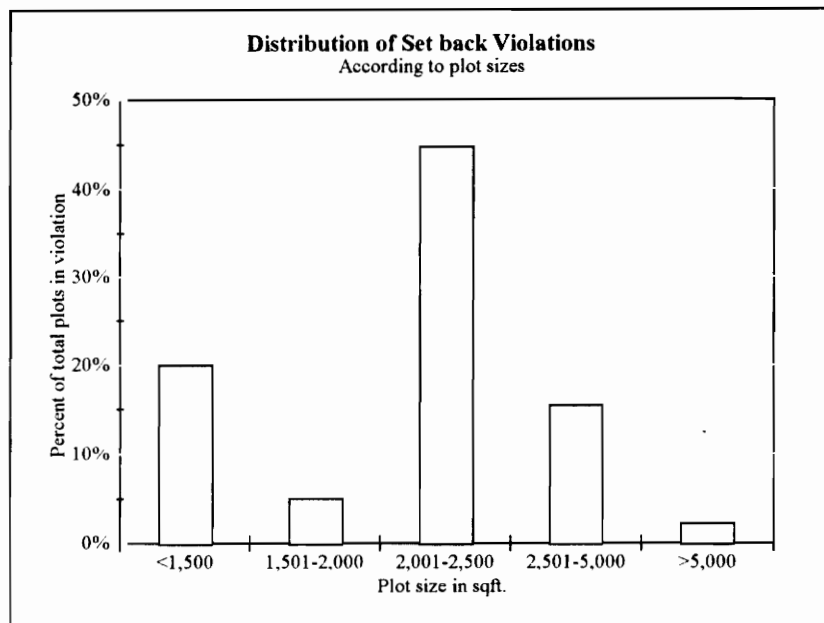
### 5.2.2 Plot Size Effects

The association between plot size and the incidence of set back violations was examined again to test whether a size (income) effect existed for violations. Also, I was interested in whether set back requirements should be tailored for smaller plot size ranges. Presently, set back requirements in Bangalore are the same for larger ranges of plot size (Table 2.3:Appendix II).

The analysis indicated that plot size was associated with the occurrence of set back violations (Figure 5.2.2). However, the association was not clearly linear. Rather, violations of set back requirements were more prevalent in the middle plot size group (2,000 sq.ft - 2,500 sq.ft.). Of the sixteen plots that are in violation of all set back requirements, five were also in violation of plot coverage requirements. These plots were built out to the allowable area and encroached the set back area. Overall, set backs violations were somewhat common in smaller plots than larger plots (75 percent in plots less than 2,500 sq.ft., and 25 percent in plots over 2,500 sq.ft.). Though residents are allowed to increase built area by adding floors, this type of construction is expensive. Most citizens do not build over two floors unless they occupied either multi-family or commercial use. Thus the less expensive way to expand useable space is to avoid set back requirements.

Violating set back regulations encroaches area that should be left as open space. Thus, violations increased built area on the ground floor. A combination of restrictive standards and need for more space seem to contribute to set back violations (Njoh 1995:

347, Mehta et.al 1989: 51, Sannapaiah 1994: 115). Interviews with architects and planners in Bangalore suggested that residents' building needs were more than currently allowed in the building regulations (interviews with Mr. Vagale, Mr. Girish, Mr. Radha Krishna et.al. --architects, Mr. Krishna Murthy, and Mr. Narasimha Murthy, et.al.-- planners, Bangalore, July, 1995).



*Figure 5.2.2 Distribution of set back violations according to plot sizes*

### 5.3 VIOLATIONS OF PLOT COVERAGE REGULATIONS

Plot coverage is the percentage of the plot area that the ground floor occupies. A total of 20 plots (9 percent) were in violation of plot coverage requirements. Thus, despite widespread set back violations, relatively fewer plots violated plot coverage requirements. Plot coverage requirements could be interpreted as applicable, i.e., not overly restrictive, in that citizens did not violate the regulation to a great extent. Also, it

would seem that set back requirements were more stringent than plot coverage requirements because of the difference in their incidence rates. Plot coverage violations were analyzed according to plot sizes, but their interpretation is not considered significant because the violations were minimal.

#### **5.4 VIOLATIONS OF FLOOR AREA RATIO (FAR) REGULATIONS**

The floor area ratio (FAR) denotes the amount of built up area on a plot with respect to its plot size. Violations of FAR requirements occur for two basic reasons: either residents extend their ground floor plate beyond the coverage requirements, or they build additional floors beyond the requirements. In either case, the rationale for violating FAR requirements is to increase the built area on a plot for residential and commercial use. Urban land in Bangalore is expensive, and citizens can increase floor space by violating FAR regulations. If FAR regulations are ignored, building density of neighborhoods will increase. This can have a positive effect on urban form, decreasing, for example, transportation distances between residences and work zones (Njoh 1995: 345, Dowall 1992: 15). However, it can also lead to crowding, congestion, and unsafe building conditions.

Twenty-five plots (11 percent) were in violation of floor area ratio regulations. Of these twenty-two plots were residential and three plots were commercial. No plots were in violation of required number of floors. Therefore it was the floor plate sizes that resulted in excess floor area ratio values. Increasing floor plate directly results from

increasing plot coverage. Plot coverage is in turn influenced by set back requirements. Thus, it is important to analyze the distribution of violations of FAR regulations with violations of set back and plot coverage requirements (Table 5.4.1 and Table 5.4.2).

*Table 5.4.1 Distribution of Floor Area Ratio Violations with respect to Plot Coverage and Number of Floors*

Plot Coverage Violations	Yes	No
Number of Floors violations		
Yes	0	0
No	20	5

*Table 5.4.2 Distribution of Floor Area Ratio Violations with respect to Plot Coverage and Set Back Violations*

Set Back Violations	All 4 Set Backs (Yes)	1-3 Set Backs (Yes)	No
Plot Coverage Violations			
Yes	5	15	0
No	3	2	0
Total	8	17	25

Violations of FAR requirements need not violate plot coverage requirements. However, all twenty plots in Ganganagar that were in violation of plot coverage requirements had also violated floor area ratio requirements. This suggests that in the other five plots, the requirements for plot coverage may have been generous. Also, the five plots not in violation of plot coverage were in violation of all their set back requirements. Appendix IV looks at typical plot sizes and shows sample regulated and observed calculations of floor area ratio and plot coverage.

Most two and three story residential buildings are used for multi-family housing. Eighteen of the plots that were three stories high and seven plots that were two stories high violated all their set back requirements. This suggests that the relationship between set backs and number of permissible floors resulted in violations of FAR requirements. Though interviews with architects in Bangalore suggest that the requirements for FAR are restrictive, findings from this study do not adequately support this claim (interviews with Mr. Vagale, Mr. Girish, Mr. Radha Krishna et.al. --architects, Mr. Krishna Murthy, and Mr. Narasimha Murthy, et.al.--planners, Bangalore, July, 1995).

#### 5.4.1 Land Use Effects

Economic returns from violating FAR requirements depend on the use of the plot. Increased built area on commercial plots provides a greater floor space for commercial vending which will increase economic return. The logic is one of exploiting the full market potential of the plot. Similarly, residential plots can convert single-family residences to multi-family by violating the FAR requirement. This supplements citizens' income and results in more intensive use of urban land (Dowall 1992: 52, Njoh 1995: 345, McDonald 1994: 40).

Analysis did not indicate any clear association between the incidence of violations of floor area ratio requirements and the type of zoning. The violation rate for residential plots was twelve percent and for commercial plots, nine percent. The difference in their incidence rates between residential and commercial violations was not considered sufficient enough to suggest any differential economic incentive for violations.

### 5.4.2 Plot Size Effects

FAR violations were also analyzed according to plot sizes (Appendix IV). One might speculate that smaller plots would have more violations of floor area ratio regulations than larger plots because regulatory standards in developing cities often represent middle and upper income class values. Low income citizens cannot afford the standards set by the regulatory authority (Mehta et.al 1989: 51, Dowall 1992: 19, Sannapaiah 1994: 115). This question of affordability affects the compliance to floor area ratio requirements.

Analysis of violations of FAR regulations and plot size did not show a higher incidence rate of FAR violations in smaller plots and no linear relationship existed between FAR violations and plot size (Figure 5.4.2). Only eight percent of small plots (less than

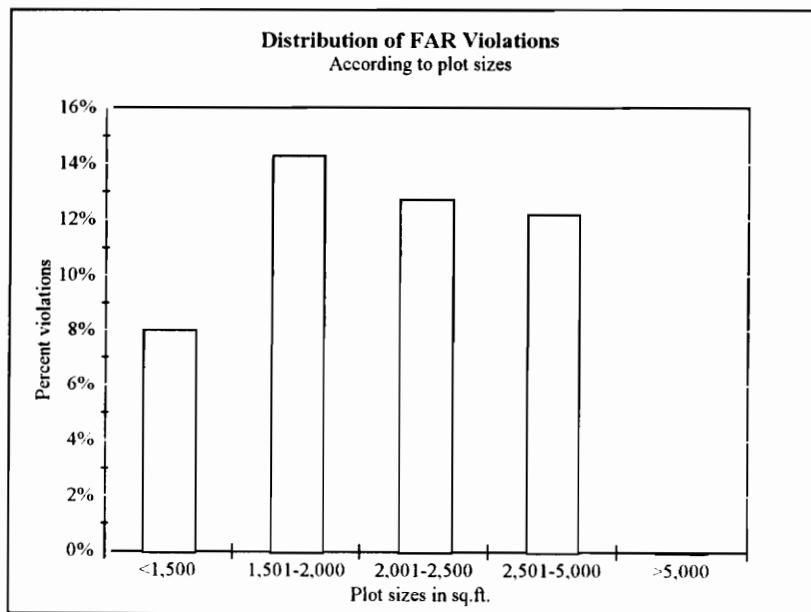


Figure 5.4.2 Distribution of FAR violations in each plot range

1,500 sq.ft.) violated FAR requirements. Plot sizes from 1,501 sq.ft to 2,000 sq.ft. had the highest incidence rate (14 percent of plots in that range).

The analysis does not support the claim that lower income groups are more willing to disregard FAR regulations. Although some studies (Mehta et.al 1989: 51, Dowall 1992: 19, Sannapaiah 1994: 115) suggest that poor citizens are subjected to higher standards of FAR requirements, empirical results derived from this study do not substantiate it. In contrast, architects who were interviewed believed that the exorbitant cost of land which has created a great demand for urban land might create incentives for violating FAR requirements in households with limited land (interviews with Mr. Vagale, Mr. Girish, Mr. Vimal Narayan, Mr. Sadasivam, Mr. Radha Krishna et.al.).

In conclusion, the theoretical speculations made about floor area ratio requirements are not supported by the findings from this study. Inherent problems in collecting data on FAR may have resulted in incorrect estimates of FAR. Floor area ratio calculations have to take porches, balconies and other exempted construction into account. Measuring these elements is difficult and under the circumstances, the closest possible estimates were draw by making assumptions. Thus, in formulating floor area ratio requirements that are more in keeping with citizens' goals, there is need for measuring FAR violations more accurately.

## **5.5 VIOLATIONS OF GARAGE AND SET BACK CONSTRUCTION REQUIREMENTS**

Twenty three and twenty six plots had violations of garage position requirements and set back construction requirements respectively. In Bangalore, both of these regulations use Western standards and represent middle and upper class values. A very small percent of the population, mostly the wealthy in Bangalore own cars. Two-wheelers like bikes and scooters are more popular. Thus, any standards for garages are only of relevance to those with automobiles.

Garages for cars are compulsory in plots with widths greater than 39 feet. Moreover, garages need driveways which are at least 9 feet wide. In most plots, this means prime building area is dedicated to driveways. Consequently, garages are seldom used for parking cars. In order to avoid right set back requirements that prescribed the driveways, citizens change the position of the garages with respect to the site. Usually, they are positioned adjoining the property line in front. This enables more space behind the garage for living area. In a number of occasions when residential plots are used for commercial activity, garages are the sites for those activities. A frontal position of the garage increases public access to commercial services.

The building bye-laws for Bangalore prohibit any kind of construction in the set back areas or in obstruction of the set back areas. This includes open stair cases in the set backs, balconies that are projecting more than allowed, balconies that are annexed into the first floor, sit-outs and decks over entrance porches, and many other minor requirements.

Compliance with these requirements incurs minor costs. Moreover, due to their near invisibility, they may be difficult to enforce.

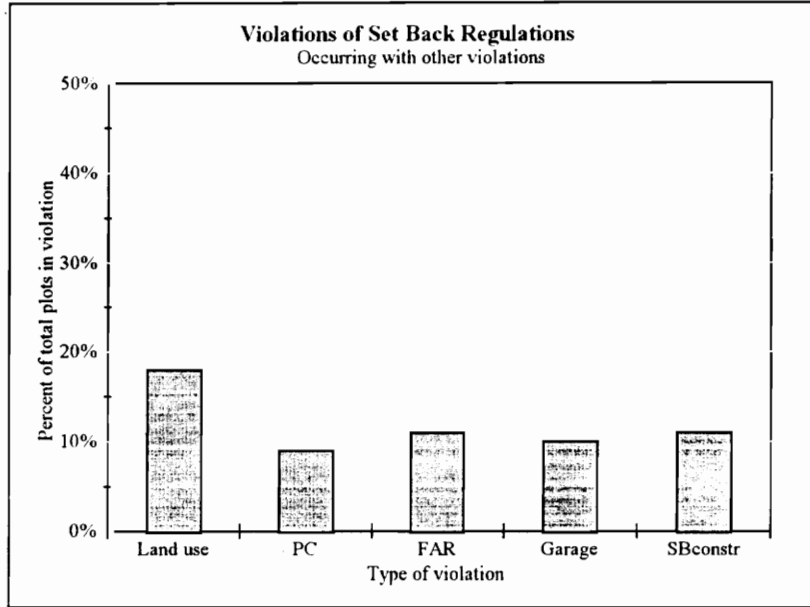
Though violations of garage and set back construction requirements are frequent, they are not considered as major violations of building regulations by architects and planners in Bangalore (Mr. Vagale, Mr. Girish, Mr. Radha Krishna et.al., Mr. Narasimha Murthy, Mr. Krishna Murthy, et.al.). Thus, there is minimal incentive to enforce such regulations.

## **5.6 PATTERNS OF VIOLATIONS**

Total violations per plot were analyzed to determine whether particular combinations or patterns of violations were evident. Land use and building regulations in developing cities specify standards for different plot and building elements independently even though they may be closely interdependent. In order to regulate development more efficiently and effectively, it is important to establish whether recurring patterns of violations occur. If the occurrence of one violation always occurs with another, the regulations could be interpreted and an integrated approach would be beneficial when regulating building and land use elements.

With six separate violations of land use and building regulation possible, the combinations were too great to consider all of them. However, because violations of land use, set backs, plot coverage, and FAR requirements were the most frequent, I focused on their combinations.

Because set backs were the most common violations, I began identifying the violation combinations occurring with set back non-compliance (Figure 5.6.1).



*Figure 5.6.1 Distribution of set back violations with other violations*

Land use and set back requirements were jointly violated in eighteen percent of the plots, most of these plots included some type of commercial activity. This result could further strengthen the claim that owners of commercial plots are more willing to violate set back requirements because they have more to gain economically (Dowall 1992: 15, Njoh 1995: 345, Mehta 1989: 58). It also suggests that perhaps commercial plots need more flexible set back requirement that make more efficient use of urban land (Dowall 1992: 15, Njoh 1995: 345). Combinations of other violations with set back violations were not considered significant because they are not widespread.

For all other combinations of violations, no pattern of incidence could be easily identified. Floor area ratio requirements have to be studied more in detail with plot coverage, set back and floor limitations. However, findings from the study suggests that strong linkages exist between floor area ratio, set back, plot coverage, and plot sizes. Thus, there is need for further investigation into patterns of violations before a comprehensive method can be evolved for regulating urban development in Bangalore.

In conclusion, the research findings could not adequately support the research claim that an economic motive resulted in different combinations of land use and building violations. Land use violations that convert residential land to commercial use may have higher economic returns. However, estimating the exact amount of benefit was beyond the scope of this research. Similarly, reduced set backs may have certain costs, for example, loss of ventilation, light, privacy, and reduced aesthetic value. These costs could not be estimated accurately enough to weight set back regulations. Other violations might also be associated with different personal or economic benefits to the owner. Biases of the researcher could have affected different values placed on violations and resulted in overestimating the magnitude of violations. As none of these values could be estimated, the research aimed at identifying a more conservative pattern of violations.

## 6. Conclusions

The main objective of this research was to establish that the pattern of violations of land use and building regulations observed was consistent with its theoretical claims. It contended that a combination of inapplicable, confusing regulations and institutional inefficiencies and enforcement problems have created an urban environment that facilitated non-compliance with building and land use regulations. The research used six different regulations and studied their pattern of occurrence in the study area of Ganganagar, Bangalore. It also gathered information from interviewing public planning officials and practicing architects in the city of Bangalore to verify whether their opinion supported the research claims.

The theory argues that regulations lack applicability when they:

1. Ignored existing cultural and social norms,
2. Imposed high standards and made housing unaffordable to the urban poor, and
3. Ignored existing land and commodity markets.

Theoretically regulatory non-compliance is present when a poor fit exists between the regulatory structure and institutional capacity to monitor and enforce regulations.

Citizens in these situations use several methods to circumvent the regulatory structure:

1. Citizens used corrupt practices, e.g., bribes and gifts, to gain favorable decisions from officials vested with the discretionary powers of allocating urban services, and

2. Citizens ignored the regulations with the hope that they go undetected by the regulatory authorities.

Several conclusions can be reached from the analysis regarding these postulates. Violations of land use regulations demonstrated an economic motivation and a poor fit between regulations and the traditional higher mix of land uses in Indian cities. Violations of set back regulations were the most prevalent and their occurrence suggested that their enforcement was more difficult than other regulations. Consequently, citizens were under no pressure to conform to regulations. Lack of enforcement also seems to explain the violations of garage and set back construction violations. Empirical results also suggested that existence of a relationship between plot size and the prevalence of violations. Though the claim that regulations did indeed restrict low-income building activity could not be directly verified. Interviews with architects and planners in Bangalore supported these conclusions. In addition, they indicated that violations of several land use and building regulations could occur because the regulations ignore cultural, social, and traditional expressions, e.g., 'Vastu' principles.

Empirical results indicate that strong locational patterns might influence the incidence of land use violations. Violations of land use regulations were observed along main thoroughfares and in the vicinity of other commercial centers. This supports the research claim that regulations ignore existing urban land and commercial markets. Lack of understanding of urban land markets has been identified as a common feature of regulatory systems in cities of other developing countries (Dowall 1992).

Though the research could not empirically test the institutional aspects that contributed to regulatory non-compliance, information from architects and planners suggested that that institutionalized bribery and corruption are rampant in Bangalore. Also, the risk of detection was minimal due to institutional inefficiencies in Bangalore's planning agencies. The combination of a maze of planning agencies and a maze of confusing planning regulations resulted in an environment widespread with regulatory non-compliance (Vagale 1988c). The observed pattern of set back violations corresponds with low visibility, and institutional inefficiency creates a situation where the risk of detection is almost non-existent in low visibility situations. Information from architects and planners confirmed that set back requirements were the most transgressed due to their near invisibility.

Findings from this research have indicated that violations of land use and building regulations may have occurred due to a combination of institutional, bureaucratic, socio-cultural, and economic factors. Interviews with public planning officials and architects from Bangalore suggest that these violations of land use and building regulations were common to the entire city. The observed pattern of violations of locational, market, and plot size effects could be generalized to other low-to-middle income neighborhoods in Bangalore although they may not be generalizable to all neighborhoods. Also the empirical results are not particularly generalizable to other cities in India or in other developing countries, some similarities could be identified between observed trends and prior research (Dowall 1992, Njoh 1995, Sannapaiah 1994, Rodwin 1981, Hardoy and

Satterthwaite 1987).

Conclusions from this research have far reaching policy implications for developing cities. The research has added insights about type, frequencies, combinations, and severity of violations of land use and building regulations in a case study neighborhood. This intimate knowledge about specific behavior of citizens in regulatory environments can help planning policy makers formulate land development controls that are tailored to particular neighborhoods. The basis for formulating regulations should be cultural, traditional, social, economic aspects with knowledge about institutional hindrances.

Most prior research on urban regulatory systems in developing countries identifies various issues that affect urban development in developing countries. They all recommend a combination of institutional, technical, and cultural solutions and emphasize the importance of comprehensive strategies for solving the complex urban problems of developing cities (Mehta et.al 1989, Dowall 1992, Sannapaiah 1994, Njoh 1995).

Sannapaiah (1994: 142-161) describes the case of Mysore, India where unauthorized developments are paralyzing urban growth. He attributes violations and unauthorized construction to various institutional, political, and regulatory factors. He estimates that about ninety percent of all construction in Mysore is unauthorized. Vagale (1988c: 13) observes that development control in Bangalore has become increasingly rigid and consequently unpopular with land-owners and property developers. Both Vagale and Sannapaiah recommend a flexible regulatory system that can incorporate changes according to citizen's needs. Sannapaiah recognizes the need for one organization that is

in charge of ordering development in any given jurisdiction.

Recognizing the importance of building and land use regulation in urban development, the United Nations Center for Human Settlements (UNCHS) organized an international 'Seminar of Experts on Building Codes and Regulations' in Sweden, 17-24 March 1980. The seminar concluded that appropriate building and land use control measures were imperative to the success of any urban development policy in developing countries. The seminar was aimed:

- Identifying principal needs, purposes, scope and role of building regulations in developing countries
- Identifying ways and means for developing new building regulations to better serve the needs and objectives as defined above
- Identifying research needs and priorities
- Recommending approaches and priorities for action in these countries at (UNCHS 1980: 16)

Several studies on development controls recommend different strategies for increasing their efficacy. Some of Njoh's (1995: 351) suggestions for modifying the building ordinance include:

- Encouragement of mixed land use patterns and
- More attainable minimum standards for housing units.

Mehta et.al., (1989: 58) suggest that differential building standards and controls for different types of developments would be more ideal as compared to existing situations. They recommend that :

- Present rules and regulations must be enforced by an extremely authoritarian system with extensive police powers, or
- Extent of control should be limited to what is manageable, and
- Provision of a system that is responsive to people's needs.

Dowall (1992: 23-25) argues that there is a need for changing urban legislation standards to meet the needs of all citizens. He suggests that land market assessments are an important tool to understand the effects of regulation on urban land markets. Land markets can dominate urban development instead of regulatory controls, and hence understanding their influence on cities is important. Improved urban regulation has to deal with improved institutional, economic, socio-cultural, and technical issues in developing countries.

Other than the factors of applicability and institutional enforcement issues, there are other factors that affect the implementation of regulatory systems in Bangalore and cities of the developing world. First, the existing regulatory system may be a source of supplementary income to the public officials who are poorly paid by the government. Receiving bribes or gifts may have cultural acceptance in many societies and the transition to widespread, debilitating corruption may be difficult to identify. Second, real estate values for residential plots are not affected by the prevalence of illegal construction and violations of regulations in Bangalore. Consequently, a lack of accountability exists between citizens of the same neighborhood. If one plot owner violates building regulations, it suggests that the neighboring plot owners can also violate regulations because no citizen monitoring or reporting of violations exists.

Cultural norms in Bangalore accept non-regulatory behavior and it is often thought to be a part of urban development (Mr. Narasimha Murthy, Mr. Vimal Narayan 1995). In effect, the theoretical process of planning development regulation is separated from the

implementation process. However, the planning process is a useful tool that politicians, economists, and planners use to lure economic investment in Bangalore. The comprehensive development plan and all the policies and projections that go with it become symbols of the success of urban planning in Bangalore and other cities of developing countries.

Placed in this context of previous research and suggested solutions, future research has to focus on the merits of regulatory and non-regulatory systems. A regulatory system inherently has problems as described in this research. Moreover, because bribes associated with violations supplement the income of public officials, they have a vested interest in retaining the system. Institutional incentives may prohibit the changing a regulatory system to a non-regulatory one.

On the other hand, relaxing or eliminating all regulatory controls can have serious development externalities. Even if existing regulations are relaxed and allow greater flexibility, current trends indicate that citizens may violate the relaxed regulations in an attempt to increase returns on their investments. Eliminating all regulations could also result in serious urban problems. Existing traffic congestion could get worse, leading to increased urban air pollution. A lack of privacy exacerbated by a lack of clean air, pollution, and a lack of adequate urban services could put the entire urban population under serious health risks. The resulting environment may change citizens' attitudes to nonchalance and scant respect for the larger development of the city.

Despite the presence land regulations in Bangalore, urban development in the city does not seem to be guided by the comprehensive development plan. Planning that uses regulatory and non-regulatory implementation tools must be an essential element of urban development in Bangalore and in other developing countries. However, currently urban regulation is being overcome by economic, political, and parochial interests. A thorough rethinking of the entire planning process and with it the regulatory process is imperative to successful urban development.

A combination of regulatory and non-regulatory methods could become a solution to current urban problems. Cities have unique urban problems for which unique solutions are needed. So flexibility in the regulatory approach is needed. Any changes must be incremental and must gain the acceptance of all the stakeholders. Each stakeholder has to perceive a monetary benefit from contributing towards a healthier and more efficient urban environment. Until that time, most efforts to plan urban development in developing cities may be futile.

## BIBLIOGRAPHY

- Bapat, 1982.**, “Red-tape, Corruption and Delay: The Cost in Terms of Red-tape, Corruption and Delay in Governmental Ownership and Control.”, in Accountability in Development: National and International- How to Have Development with the Least Bureaucracy., Leslie Sawhny Programme.1982.
- Bangalore Development Authority, 1995,** Comprehensive Development Plan (Revised), Bangalore: Zoning of Land Use Regulations, 1995.
- Bhattacharya, K.P., 1990,** “Housing in India: Observations on the Government Intervention Policies”., in Housing Policy in Developing Countries., Shidlo, G., ed., 1990, Routledge, London and New York.
- Booth, Philip., 1995,** “Zoning or Discretionary Action: Certainty and Responsiveness in Implementing Planning Policy”., in Journal of Planning Education and Research., Vol. 14, 1995: 103-112.
- Breese, Gerald., 1966,** Urbanization in newly Developing Countries., Prentice-Hall.
- Corporation of the City of Bangalore, 1983,** “Building Bye-Laws- 1983”, in Karnataka Gazette, January 26, 1984: 14-58.
- Corporation of the City of Bangalore, 1971,** “Building Bye-Laws- 1971”, in Karnataka Gazette, January 26, 1972.
- Deshpande, C.D., and Arunachalam, B., 1981,** “Bombay.”, in Problems and Planning in Third World Cities., Pacione, M., ed., 1981, St. Martin’s Press, New York: 187-217.
- Devas, Nick., and Rakodi, Carole., eds., 1993,** Managing Fast Growing Cities: New Approaches to Urban Planning and Management in the Developing World., Longman Scientific & Technical and John Wiley & Sons Inc., New York.
- Dowall, David., E., 1991,** The Land Market Assessment: A New Tool for Urban Management., Urban Management and Land.
- Dowall., David., E. and Clarke, Giles., 1991,** A Framework for Reforming Urban Land Policies in Developing Countries., Policy Paper, November 1991, Urban Management and Land.
- Dowall, David, E., 1992,** “The Benefits of Minimal Land Development Regulation”, in Habitat International., Vol. 16, No. 4, 1992: 15-26.

- Dowall, David, E.**, 1992, "Benefits of Minimal Land Use Regulations in Developing Countries", in Cato Journal, Vol. 12, No. 2, Fall 1992: 413-423.
- D'Souza, Bain., J.**, 1992, "Will Bombay have a Plan?" in Habitat International., Vol. 16, No. 2, 1992: 89-98, Pergamon Press Ltd.
- Dwyer, D. J.**, ed., 1974, The City in the Third World., The Macmillan Press Ltd. London.
- Encarta**, 1996, Encyclopedia, Microsoft Corporation 1996.
- Gardiner, John. A., and Lyman, Theodore., R.**, 1978, Decisions for Sale: Corruption and Reform in Land Use and Building Regulation., Praeger Publishers, New York.
- Gardiner, John., A.**, 1985, "Corruption and Reform in Land Use and Building Regulation: Incentives and Disincentives", in Ethics in Planning., Wachs, Martin. ed, 1985: 121-141.
- Gist, Noel., P.**, 1957, "The Ecology of Bangalore, India: An East-West Comparison", in Indian Cities: Ecological Perspectives, Tewari, Vinod., K., Weinstein, Jay., A., and Rao, Prakash., V.L.S., eds. 1986, Concept Publishing Company, New Delhi, 1986: 15-34.
- Gnaneshwar, V.**, 1995, "Urban Policies in India- Paradoxes and Predicaments", in Habitat International., Vol. 19, No. 3, 1995: 293-316, Pergamon Press Ltd.
- Hope, Kempe., R.**, 1983, "Some Problems of Administering Development in Developing Nations", in Indian Journal of Public Administration., Vol. 29, No. 1, 1983: 1-10.
- Hardoy, J., and Satterthwaite, D.**, 1987, "The Legal and the Illegal City.", in Shelter, Settlement, and Development., Rodwin, L., ed., 1987, United Nations, Allen and Unwin, Boston.
- Jagannathan, Vijay.**, 1987, "Corruption Systems in Developing Countries", in Informal Markets in Developing Countries., 1987: 108-117.
- Keeble, L.**, 1964, Principles and Practice of Town and Country Planning., London, Estates Gazette.
- Lang, J.**, 1994, Urban Design: The American Experience., Van Nostrand Reinhold, New York.

- Levy, John, M.**, 1991, Contemporary Urban Planning, 2nd edition, Prentice Hall, New Jersey.
- McAuslan, P.**, 1989, "Law in Development: A Review of Experience." Paper presented to the Workshop on Planning and Management of Urban Development in the 1990s, Birmingham, September 1989.
- McDonald, Hamish.**, 1994a, "Squatter's Rights", in Far Eastern Economic Review., June 30, 1994: 40-41.
- McDonald, Hamish.**, 1994b, "Home on the Range: Middle-class Indians move to the suburbs", in Far Eastern Economic Review., June 30, 1994: 42.
- McLoughlin, Brian, J.**, 1973, Control and Urban Planning, Faber and Faber Limited, London.
- Mehta., Barjor, Mitra, Banashree, C., and Nientied, Peter**, 1989, "Building Regulation and Low-income Housing: A Case Study from India", in Cities, February 1989: 50-58.
- Njoh, Ambe., J.**, 1995, "Building and Urban Land Use Controls in Developing Countries: A Critical Appraisal of the Kumba (Cameroon) Zoning Ordinance", in Third World Planning Review., Vol. 17, No. 3, August 1995: 337-356.
- Payne, Geoffrey., K.**, 1977, Urban Housing in the Third World., London: Leonard Hill, Boston: Routledge & Kegan Paul.
- Poulose, Thomas., K.**, 1979, Experiences and Experiments in Town and Country Planning.
- Ramachandran, R.**, 1989, Urbanization and Urban Systems in India., Oxford University Press, New Delhi.
- Rao, Prakash., V.L.S., and Tewari, Vinod., K.**, 1986, "The Ecological Structure of Bangalore City", in Indian Cities: Ecological Perspectives., Tewari, Vinod., K., Weinstein, Jay., A., and Rao, Prakash., V.L.S., eds. 1986, Concept Publishing Company, New Delhi, 1986: 221-242.
- Rodwin, Lloyd., et.al.**, 1981, Cities and City Planning, Plenum Press, New York and London.
- Rodwin, Lloyd.,ed.** 1987, Shelter, Settlement and Development., Allen & Unwin, Boston.

**Rosser, Colin.**, 1972, Urbanization in India., International Urbanization Survey, The Ford Foundation.

**Rivkin, M.D.**, 1976, Land Use and the Intermediate-Size City in Developing Countries., Praeger Publishers, New York.

**Sannapaiah, H. V.**, 1994, Unauthorized Developments in Mysore City: Planning and Development Problems., Master's Thesis, Institute of Development Studies, University of Mysore, February 1994.

**Server, O. B.**, 1996, "Corruption: A Major Problem for urban Management, Some Evidence from Indonesia", in Habitat International., Vol. 20, No. 1, 1996: 23-41, Pergamon Press Ltd.

**Sheth, Nina., S.**, 1989, Public Policy and Private Provision: Housing in India 1947-1989., Major Paper, Virginia Polytechnic Institute and State University, Blacksburg, VA.

**Town and Country Planning Organization and The Development Administration Group (TCPO)**, 1988, Indian Capsule Programme on "Management of Urban Development": The Management of Urban Fringe Land Development in Bangalore., January 1988, Bangalore.

**Turner, Alan.**, 1985, "The effects of Development Control on the Growth of Rapidly Expanding Cities", in Habitat International., Vol. 9, No. 3/4, 1985: 151-156, Pergamon Press Ltd.

**United Nations Center for Human Settlements (UNCHS) and Swedish Council for Building Research**, 1980, UN Seminar of Experts on Building Codes and Regulations in Developing Countries., Report on the UN Seminar of Experts on Building Codes and Regulations in Developing Countries, Tallberg and Stockholm, March 1980.

**Vagale, L. R.**, 1988a, An Overview of the Metropolitan Economy and Land Uses: Focus on Bangalore., paper presented at the Indian Capsule Programme on "Management of Urban Development", January 1988, Bangalore.

**Vagale, L. R.**, 1988b, A Review of Urban Land Policies and Land Use Control Measures in India: Need for and Innovative Approach., Technical Paper presented to the National Urbanization Commission, Physical Planning Working Group, Government of India, Ministry of Urban Development, New Delhi, February 1988.

**Vagale, L. R.**, 1988c, Land Use Controls and their Impact on Land Situation in Metropolitan Bangalore, paper presented at the Indian Capsule Programme on “Management of Urban Development”, January 1988, Bangalore.

**Vagale, L. R.**, 1988d, Bangalore: The Exploding and Deteriorating Metropolis, paper presented at the Indian Capsule Programme on “Management of Urban Development”, January 1988, Bangalore.

**Wade, Robert.**, 1982, “The System of Administrative and Political Corruption: Canal Irrigation in South India”, in Journal of Development Studies, Vol. 18, No. 3, 1982: 287-328.

**Wade, Robert.**, 1985, “The Market for Public Office: Why the Indian State is not Better at Development”, in World Development, Vol. 13, No. 4, 1985: 467-497.

# APPENDIX I

## FIELD SURVEY INSTRUMENT

1. Survey Number: \_\_\_\_\_

2. Plot Number: \_\_\_\_\_

3. Plot Size:

(i) Width \_\_\_\_\_ (ft.)

(ii) Depth \_\_\_\_\_ (ft.)

4. Minimum Plot Area: \_\_\_\_\_ (sq.ft.)

4A. Plot Area: \_\_\_\_\_ (sq.ft.)

5. Land use as allowed by the CDP:

(i) Residential only

(ii) Commercial only

(iii) Industrial

(iv) Parks and open space

(v) Public/semi-public

(vi) Transportation

(vii) Unclassified

5A. Existing land use:

(i) Residential only

(ii) Commercial only

(iii) Industrial

(iv) Parks and open space

(v) Public/semi-public

(vi) Transportation

(vii) Unclassified

(viii) Under construction or vacant plot

(ix) Residential with some commercial use

(x) Commercial with some residential use

6. Minimum front set back as per Bye-laws: \_\_\_\_\_ (ft.)

- 6A. Existing front set back: \_\_\_\_\_(ft.)
7. Minimum side 1 set back as per Bye-laws: \_\_\_\_\_(ft.)
- 7A. Existing side 1 set back: \_\_\_\_\_(ft.)
8. Minimum side 2 set back as per Bye-laws: \_\_\_\_\_(ft.)
- 8A. Existing side 2 set back: \_\_\_\_\_(ft.)
9. Minimum rear set back as per Bye-laws: \_\_\_\_\_(ft.)
- 9A. Existing rear set back: \_\_\_\_\_(ft.)
10. Maximum number of floors allowed as per Bye-laws: \_\_\_\_\_
- 10A. Existing number of floors: \_\_\_\_\_
11. Maximum height of building allowed as per Bye-laws: \_\_\_\_\_
- 11A. Existing height of building: \_\_\_\_\_(ft.)
12. Construction in set back area:
- (i) Yes
  - (ii) No
13. Garage location:
- (i) According to regulations
  - (ii) Not according to regulations
  - (iii) No garage
14. Minimum road width as per Bye-laws: \_\_\_\_\_(ft.)
- 14A. Existing road width: \_\_\_\_\_(ft.)

## CODE BOOK

QUEST#	VARIABLE NAME	CODE/VALUE	MISSING
1.	SURNUM	1-221	-
2.	PLOTNUM	1-326	-
3A.	PSIZEW	0-500	999
3B.	PSIZED	0-500	999
4.	PAREA	0-99999	.99
4A.	MINAREA	100	-
5.	RLDUSE	1. RESI 2. COMM 3. INDUS 4. PARK 5. PUB 6. TRANSP 7. UNCLASS	0
5A.	ELDUSE	1. RESI 2. COMM 3. INDUS 4. PARK 5. PUB 6. TRANSP 7. UNCLASS 8. UNCONS 9. MIXEDR 10. MIXEDC	0
6.	RFSBK	0-99	-
6A.	EFSBK	0-99	999/1000
7.	RS1SBK	0-99	-

7A.	ES1SBK	0-99	999/1000
8.	RS2SBK	0-99	-
8A.	ES2SBK	0-99	999/1000
9.	RRSBK	0-99	-
9A.	ERSBK	0-99	999/1000
10.	RFLRS	0-9	-
10A.	EFLRS	0-9	99
11.	RHEIGHT	0-999	-
11A.	EHEIGHT	0-999	1000
12.	CONSBK	1- YES 0- NO	0
13.	GARAGE	1- VIOL 0- NOVIOL	0
14.	RROAD	0-999	-
14A.	EROAD	0-999	1000
15.	RPCOV	0-100	-
15A.	EPCOV	0-100	1000
16.	RFAR	0-5	-
16A.	EFAR	0-5	999/1000

## INFORMATIONAL SURVEY QUESTIONNAIRES

Informational surveys questionnaires were administered to architects and public planning officials in Bangalore. These helped inform the researcher of important issues and variables that are relevant to the study.

### Questionnaire of Architects

1. Number of years in the job: \_\_\_\_\_
2. Specializes in construction of the following buildings:
  - a) Residential
  - b) Commercial
  - c) Public/semi-public
  - d) Industrial
  - e) Other \_\_\_\_\_
3. How many residence plans are sent for corporation/BDA approval every month/year?  
\_\_\_\_\_
4. Out of these plans, how many working plans correspond with the corporation approved plan? \_\_\_\_\_
5. If there are any changes, they are usually \_\_\_\_\_
6. These changes are recommended by
  - a) Architect
  - b) Client
  - c) Other
7. Why do you think clients usually do not comply with building and land use regulations?  
\_\_\_\_\_

8. Presently, what kind of building bye-law enforcement (by the BDA and the City Corporation) is prevailing in Bangalore?

- a) Minimal
- b) Selectively minimal
- c) Mediocre
- d) Strict
- e) Selectively strict

9. Ideally, what kind of a building bye-law and land use regulatory system would be beneficial for the development of Bangalore? \_\_\_\_\_

10. What are your opinions about residential development and infrastructure provision by the City Corporation and the BDA? \_\_\_\_\_

11. On an average, your clients fit into which of the income/month categories?

- a) Rs<sup>1</sup>. 5,000 and below
- b) Rs. 10,000 - Rs. 5,000
- c) Rs. 20,000 - Rs. 10,000
- d) Rs. 20,000 and above
- e) Other \_\_\_\_\_

12. What role do you think bribery and corruption play in residential non-compliance of building and land use regulation by the citizens of Bangalore? \_\_\_\_\_

---

---

<sup>1</sup> Rs: Indian Rupees (1US\$ = approx. Rs. 35)

## Questionnaire of Public Officials

1. Organization:

- a) BDA
- b) City Corporation
- c) Other \_\_\_\_\_

2. Number of years in the job: \_\_\_\_\_

3. Position in the organization: \_\_\_\_\_

4. Job responsibilities are \_\_\_\_\_

5. According to you, what is the extent of compliance by residential owners to building bye-laws and land use regulations?

- a) Minimal
- b) Moderately minimal
- c) Moderate
- d) Moderately high
- e) High

6. On an average, how many applications are received for plan approval by your department (residential plans)? \_\_\_\_\_

7. Out of these, how many are granted approval? \_\_\_\_\_

8. Out of these, how many are rejected and sent back for revisions? \_\_\_\_\_

9. To what extent do you think that residential owners actually follow the approved plan?

- a) Follow it closely
- b) Fairly close with few minor changes
- c) Quite a few changes
- d) Many changes
- e) Do not follow the approved plan at all

10. Why do you think that there is or is not much compliance to building bye-laws and land use regulations in Bangalore? \_\_\_\_\_

11. What are the usual kinds of violations that people commit while building residences?

---

12. What kind of enforcement of these regulations is presently in force by the BDA and the City Corporation?

- a) Lenient
- b) Selectively lenient
- c) Selectively strict
- d) Very strict
- e) Flexible

13. What role do you think bribery and corruption play in people's non-compliance to building bye-laws and land use regulations? \_\_\_\_\_

14. To what extent has the BDA and the City Corporation been successful in providing infrastructure to the citizens of Bangalore?

- a) Poor
- b) Minimal success
- c) Moderate success
- d) Quite successful
- e) Excellent provision

15. Other comments about residential development in Bangalore City \_\_\_\_\_

---

## APPENDIX II

### REGULATIONS (General Building Requirement Section, Bangalore City Bye-

Laws, 1984, 1971)

Plot Requirements: (pp. 27-28): Minimum plot size = 100sq.m

Means of Access (pp. 28-29): every person intending to build shall provide a means of exclusive access not less than 3.6 meters in width for buildings upto 3 floors and 5 meters in width for buildings more than 3 floors.

Open Spaces, Coverage, and FAR limits (pp. 28-35):

Residential buildings: Every room intended for human habitation shall abut an interior or exterior open space. These details are prescribed in the set back requirements for residential buildings. Table 2.1 and Table 2.2 list set back requirements for residential buildings in Zone C. Table 2.3 lists the set back requirements for commercial buildings in Zone C.

*Table 2.1 Front and Rear Set Back Requirements for Residential Buildings*

Depth of Site in meters	Min front set back in meters	Min rear set back in meters
<9 (30')	1.00 (3')	1.00 (3')
9 (30') - 12 (39')	1.5 (5')	1.00 (3')
12 (39') - 15 (49')	1.75 (6')	1.35 (4')
15 (49') - 18 (59')	2.25 (8')	1.75 (5')
18 (59') - 21 (69')	3.00 (10')	2.00 (6')
21 (69') - 24 (79')	4.00 (13')	2.25 (7')
24 (79) - 27 (89')	4.50 (15')	2.50 (8')
27 (89') - 30 (99')	5.50 (18')	3.00 (10')
30 (99') - 36 (110')	6.25 (21')	4.00 (13')
36 (110') - 44 (145')	8.00 (26')	4.50 (15')
> 44 (145)	10.00 (33')	4.50 (15')

Source: Bangalore City Bye-Laws 1984: 29.

*Table 2.2 Side Set Backs for Residential Buildings*

Width of site in meters	Left set back in meters	Right set back in meters
< 6 (19')	-	1.00 (3')
6 (19') - 9 (29')	1.00 (3')	1.00 (3')
9 (29') - 12 (39')	1.00 (3')	2.00 (6')
12 (39') - 15 (49')	1.25 (4')	3.00 (10')
15 (49') - 18 (59')	1.50 (5')	3.00 (10')
18 (59') - 21 (69')	2.00 (6')	3.50 (11')
21 (69') - 24 (79')	2.50 (8')	4.00 (13')
24 (79) - 27 (89')	3.00 (10')	4.50 (15')
27 (89') - 30 (99')	3.75 (12')	5.25 (18')
> 30 (99')	4.50 (15')	6.00 (20')

Source: Bangalore City Bye-Laws 1984: 29.

*Table 2.3 Set Back Requirements for Commercial Buildings*

Plot Area in Sqft.	Front Set Back	Rear Set Back	Left Set Back	Right Set Back
< 2,400	6.5'	3'	3'	6.5'
2,401 - 5,000	10'	5'	6.5'	8'
5,001 - 7,500	15'	6.5'	8'	10'
7,501 - 10,000	20'	13'	13'	16'
> 10,001	26'	21'	16'	26'

Source: Bangalore City Bye-Laws 1984: 30.

### Garages

- No side or rear set backs are insisted.
- One upper floor not exceeding 3 m height shall be permitted, provided there are no openings provided towards neighboring plots and has at least one opening for light and ventilation.
- Garages are allowed on the right hand rear corner of the plot.
- In the case of corner plots, the garage will be located at the corner diagonally opposite to the road intersection.
- Maximum width of garage shall not exceed 4 meters (14').

### Area and Height Limitations

The maximum number of floors, percentage of plot coverage, and FAR for different plot sizes and widths of roads is given in Tables 2.3, 2.4, and 2.5 below:

Table 2.3 Area and Height requirements for different site areas  
Residential Buildings

Plot area in sq. meters	Maximum plot coverage (%)	Floor Area Ratio (FAR)	Maximum number of floors	Maximum height in meters	Min road widths in meters
< 240	60	1.25	1+2	11	< 9
241 - 500	55	1.25	1+3	14	9 - 12
501 - 750	50	1.50	1+3	14	12 - 15

Source: Bangalore City Bye-Laws 1984: 32.

Table 2.4 Area and Height requirements for different site areas  
Commercial Buildings

Plot area in sq. meters	Maximum plot coverage (%)	Floor Area Ratio (FAR)	Maximum number of floors	Maximum height in meters	Min road widths in meters
< 240	65	1.50	1+2	11	< 9
241 - 500	60	1.50	1+3	14	9 - 12
501 - 750	55	1.75	1+4	17	12 - 15

Source: Bangalore City Bye-Laws 1984: 32

Table 2.5 Area and Height requirements for different site areas  
Public and Semi Public Buildings

Plot area in sq. meters	Maximum plot coverage (%)	Floor Area Ratio (FAR)	Maximum number of floors	Maximum height in meters	Min road widths in meters
< 240	65	1.50	1+2	11	< 9
241 - 500	60	1.80	1+3	14	9 - 12
501 - 750	55	2.00	1+4	17	12 - 15

Source: Bangalore City Bye-Laws 1984: 32

Land Use Classification and occupancies permitted (pp. 48-49)

Classification of land use zones

- I) Residential
- II) Commercial (retail and wholesale businesses)
- III) Industrial (light and service industry, medium industry, and heavy industry)
- IV) Parks, Playgrounds, and recreational area
- V) Public and Semi Public
- VI) Transport and Communication
- VII) Agriculture
- VIII) Defense (unclassified)

Land use zones prescribe single use buildings only and only a few related uses are allowed in those zones.

Uses that are permitted (under special circumstances) in residential zones

Dwellings, boarding houses (non-commercial), rooming houses (commercial), places of public worship, schools offering general education, libraries (public), posts and telegraph offices, KEB (Karnataka Electricity Board) counters, non-profit clubs, milk booths and consulting rooms for professionals.

Uses that are permitted (under special circumstances) in retail commercial zones:

Retail businesses, banks, offices, restaurants, public use buildings, and small gas stations.

## APPENDIX III

### GLOSSARY OF TERMS USED IN THE BANGALORE CITY BYE-LAW, (1983: 15-19)

*Bye-laws:* are regulations that apply to building activity within the jurisdiction of the Bangalore City Corporation. They were enforced from the 27th of April, 1984.

*Authority:* Commissioner of the City Corporation or an official who is delegated with the powers of sanction of building licenses.

*Apartment:* a room or a suite of rooms, which is occupied or is designed to be occupied by one family for living purposes.

*Balcony:* horizontal projection including a handrail or balustrade, to serve as passage or sitting out area.

*Basement or cellar:* any story which is partly or wholly below the level of the center of the road in front. It should not project more than one meter above this said road level.

*Building includes:*

- a house, out house, stable, privy, shed, hut, well, or any other structure made of any building material whatsoever.
- a structure on wheels resting on the ground without foundation.
- a ship, vessel, boat, tent and any other structure used for human habitation or used for keeping animals or storage.

*Building Line:* line upto which the plinth (foundation) of a building may lawfully extend on a street or an extension of a street.

*Chajja:* a continuous sloping or horizontal projection provided over an opening or an external wall to provide protection from the sun and rain.

*Covered Area:* area covered by a building(s) immediately above plinth level, but does not include space covered by:

- garden, rockery, and other elements with no ceilings or side walls.
- drainage conduits, culverts, gutters, and other utility areas.
- Compounds and fences, uncovered staircases, single storied porches and porticos, and areas covered by chajjas.

*Density*: concentration of population expressed in terms of number of persons per hectare in any particular area.

*External Wall*: an outer wall of the building not being a partition wall even if it is adjoining a wall of another building. It is also a wall of any building abutting an exterior open space.

*Floor*: lower surface in a story on which one normally walks in a building. This term shall not refer to a 'Mezzanine floor'.

*Ground Floor*: the floor immediately above the level of the adjoining ground on all sides, or above the basement floor.

*First Floor*: the floor immediately above the ground floor, on which second and other floors follow subsequently.

*Mezzanine Floor*: is any intermediate floor between two floors above ground level accessible only from the lower floor. The area of a mezzanine floor is restricted to one third of the floor area.

*Floor Area Ratio (FAR)*: is the quotient obtained by dividing the total covered area on all the floors by the area of the plot.

$$FAR = \frac{\text{Total Covered Area}}{\text{Plot Area}}$$

*Garage*: a structure designed or used for the parking of vehicles.

*Height of Building*: is the vertical distance measured in case of flat roofs from the top level of the adjoining road in front to the top of the roof. In case of pitched roofs, it is the distance upto the point where the external surface of the outer wall intersects a finished surface of the sloping roof. Architectural features that serve only an aesthetic purpose are excluded in measuring building height. Water tanks, chimneys, parapets and lift rooms are all excluded while calculating building height.

*License*: a permission or authorization in writing by the authority to carry out work regulated by the bye-laws.

*Occupancy or use group*: is the principal occupancy for which a building or a part of the building is used or intended to be used. An occupancy shall be deemed to include subsidiary occupancies that are contingent upon it. The building use classification and definitions applicable for the purpose of building bye-laws and land use classification

shall be based on the provisions of Zoning Regulations approved under the Karnataka Town and Country Planning Act, in Schedule I of the Bangalore City Bye-Laws.

- *Residential Building*: building used or constructed or adopted wholly for human habitation and includes garages, and other out houses needed for normal use of the building as a residence.
- *Public and semi public building*: building used or intended to be used either ordinarily or occasionally by the public such as a church, temple, mosque or any place of worship, college, school, library, or any place for public assembly.
- *Commercial Building*: include any building or part of a building that is used as shops, market, for display and sale of merchandise, either wholesale or retail. It includes buildings used for transaction of business or keeping accounts for similar purposes; professional services, petrol bunks, restaurants, lodges, nursing homes, cinema houses, banks, clubs, storage and service facilities related to the sale of merchandise.
- *Industrial Building*: a building wholly or principally used as a factory for the manufacture of products of all kinds including fabrication and assembly, power plants, refineries, gas plants, distilleries, breweries, dairies, factories, workshops, and other manufacturing activities.
- *Hazardous Building*: include any building which is used in part or whole for the storage, handling, manufacture, or processing of highly combustible or explosive materials.
- *Open Space*: an area left open to sky, that is an integral part of the plot.

*Plot or site*: is a parcel or piece of land demarcated by a definite boundary and includes all the within the curtilage of the building and forming its appurtenance, such as out buildings, yard, open spaces and garden attached. This excludes land allotted for any street, lane, passage, pathway, or for any other common purposes.

*Corner Plot*: plot facing two or more intersecting streets.

*Porch or portico*: a roof cover supported on pillars or cantilevered projection for the purpose of pedestrian or vehicular approach to a building.

*Road Width*: the distance between the boundaries of a road or street including footways and drains measured at right angles to the direction of such a road or street.

*Set Back Line:* a line prescribed under the bye-laws beyond which nothing can be constructed towards the plot boundary.

*Zoning Regulations:* regulations issued along with the development plan of the city prepared under the TCPA, prescribing the uses permissible in different land use zones, the open spaces around buildings, building coverage, floor area ratio, height of the building, parking, and other such requirements.

## APPENDIX IV

### SAMPLE 1

Plot Number: 144

Plot Area: 1,350 sq. ft.

Plot Size: 30'X45'

#### Regulated and Observed Values

Element	Regulated Value	Observed Value
Front Set Back	6.5'	2'
Side 1 Set Back	6.5'	2'
Side 2 Set Back	3.25'	2.5'
Rear Set Back	3.25'	0'
Number of Floors	3	3
Plot Coverage	60%	81%
Floor Area Ratio	1.25	1.54

### SAMPLE 2

Plot Number: 67A

Plot Area: 1,900 sq. ft.

Plot Size: 38'X50'

#### Regulated and Observed Values

Element	Regulated Value	Observed Value
Front Set Back	7.3'	4'
Side 1 Set Back	6.5'	3'
Side 2 Set Back	3.25'	2'
Rear Set Back	5.75'	2'
Number of Floors	3	3
Plot Coverage	60%	75%
Floor Area Ratio	1.25	1.45

**SAMPLE 3**

Plot Number: 34

Plot Area: 2,400 sq.ft.

Plot Size: 60'X40'

*Regulated and Observed Values*

Element	Regulated Value	Observed Value
Front Set Back	9.8	3
Side 1 Set Back	9.8	0
Side 2 Set Back	4.0	2.5
Rear Set Back	6.5	0
Number of Floors	3	3
Plot Coverage	60%	89%
Floor Area Ratio	1.25	1.6

**SAMPLE 4**

Plot Number: 19

Plot Area: 4400 sq.ft.

Plot Size: 50'X88'

*Regulated and Observed Values*

Element	Regulated Value	Observed Value
Front Set Back	14.75	0
Side 1 Set Back	14.75	0
Side 2 Set Back	5	0
Rear Set Back	8.2	2
Number of Floors	4	3
Plot Coverage	55%	97%
Floor Area Ratio	1.25	1.85

**JAYASHREE NARAYANA**

---

73/14 2<sup>nd</sup> Cross 2<sup>nd</sup> Main, Ganganagar Layout Bangalore 560032, India

---

**Date of Birth** SIX NOVEMBER, NINETEEN HUNDRED AND SEVENTY.

---

**Objective** INTERNATIONAL DEVELOPMENT PLANNER

---

**Education** MASTER OF URBAN AND REGIONAL PLANNING,  
International Development, Land Use Planning, and Urban Design  
*Virginia Polytechnic Institute and State University* - Blacksburg, Virginia  
THESIS: Violations of Land Use and Building Regulations: Evidence from  
a Case Study in Bangalore, India.  
Thesis Chair: Dr. James R. Bohland.

BACHELOR OF ARCHITECTURE  
*Bangalore University*, Bangalore, India

**Research  
Interests** Land Use Planning, Urban Design, and GIS applications in International  
Development