

Government of Karnataka
Bangalore Development Authority

Bangalore Master Plan - 2015

VOLUME I
Vision Document

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Abbreviations

BBMP	:	Bruhat Bangalore Mahanagara Palike
BDA	:	Bangalore Development Authority
BESCOM	:	Bangalore Electricity Supply Company.
BIAAP	:	Bangalore International Airport Area Planning Authority
BMA	:	Bangalore Metropolitan Area
BMICPA	:	Bangalore-Mysore Infrastructure Corridor Project Area
BMLTA	:	Bangalore Metropolitan Land Transport Authority
BMR	:	Bangalore Metropolitan Region
BMRDA	:	Bangalore Metropolitan Region Development Authority
BMTC	:	Bangalore Metropolitan Transport Corporation
BRT	:	Bus Rapid Transit
BWSSB	:	Bangalore Water Supply and Sewerage Board
CAA	:	Constitutional Amendment Act
CBA	:	Central Business Area
CBOs	:	Community Based Organization
CDP	:	City Development Plan
CPHEEO	:	Central Public Health and Environment Engineering Organization
CPS	:	Coordinated Planning Schemes
DCRs	:	Development Control Regulations
FAR	:	Floor Area Ratio
FDI	:	Foreign Direct Investment
FYP	:	Five Year Plan
GBWASP	:	Greater Bangalore Water and Sanitation Project
GoK	:	Government of Karnataka
IEC	:	Information, Education and Communication
IPO	:	Initial Public Offering
IT	:	Information Technology
ITPL	:	International Technology Park Ltd
JNNURM	:	Jawaharlal Nehru National Urban Renewal Mission
KHB	:	Karnataka Housing Board
KPTCL	:	Karnataka Power Transmission Corporation Limited
KSCB	:	Karnataka Slum Clearance Board
KSRTC	:	Karnataka State Road Transport Corporation
KTCP	:	Karnataka Town and Country Planning
KUIDFC	:	Karnataka Urban Infrastructure Development and Finance Corporation
LPA	:	Local Planning Area
LRT	:	Light Rail Transit
LSGIs	:	Local Self Government Institutions
MICE	:	Meetings, Incentives, Conventions and Exhibitions
MoA	:	Memorandum of Agreement
MoUD	:	Ministry of Urban Development
MSW	:	Municipal Solid Waste
NGOs	:	Non-Government Organization
RGGVY	:	Rajeev Gandhi Grameena Vidyuth Yojana
RLMS	:	Rural Load Management Systems
RMP	:	Revised Master Plan
SEZ	:	Special Economic Zones

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Executive Summary

The technological revolution has resulted in fundamental changes as to how and where people work, live and play in modern day society. This has been coupled with unprecedented growth in certain developed countries and has culminated in the creation of new economies based on service provision. Such change has brought with it challenges commonly associated with unpredicted growth; traffic congestion, urban sprawl, the abandonment of inner cities, poor access to education and a perceived lack of affordable housing.

Bangalore has been substantially affected by globalization and rapid urbanization over the last decade. With an anticipated population of 9.9 million in the year 2021, the demand on services and the quality of life in the city is not confined to the central core or the erstwhile Bangalore Mahanagar Palike jurisdiction but spreads beyond into the peri-urban areas, the Metropolitan Area and outwards, into the Bangalore Metropolitan Region. With the emergence of the Bangalore-Mysore Infrastructure Corridor, the Bangalore International Airport, planned ring roads and satellite townships, urbanization is no longer confined to the Bangalore Metropolitan Area and is expected to spread into the Bangalore Metropolitan Region (BMR).

In line with the approach to developing the city into an international metropolis, the current Master Plan adopts a more integrated approach in terms of economic, environmental and societal factors. The Plan incorporates a more cyclical model that accord with the holistic principles of Smart Development and more prudent use of resources. The planning is more participatory, founded on the principles of collaboration and consensus building and scope for all stakeholders to be involved in the decision making process – the planning methodology attempts to ensure that neighborhoods, the city and the region accommodates growth in ways that are economically sound, environmentally responsible and socially supportive of community liveability, now and in the future. The Master Plan therefore addresses long-term sustainable development through the following directive principles:

- **Nature.** Natural and hydraulic balances must be respected allowing controlled urbanization in plateau areas and also the management and usage of ground water.
- **Economic Efficiency.** Economic competitiveness to facilitate quality spaces for the service sectors, industrial activity, advanced technology training and distribution of transport and logistic facilities must be achieved.
- **Social Equity.** The principle of equal access to infrastructure facilities, public transportation and safe decent houses for the economically weaker sections must be ensured.
- **Historical Heritage.** Rapid changes and economic activity need to be monitored and managed so that the Bangalore's heritage is conserved.

The Master Plan drew from various reports and documents prepared for the specific purpose of developing the Master Plan, 2015 and were adequately supported through data and information from baseline – primary and secondary – surveys. Field investigations and information provided by Government and parastatal institutions formed key inputs to

the Master Plan. An Advisory Committee gave its recommendations on the Draft Master Plan in November 2005; recommendations of the Committee have largely governed the output of the Master Plan, 2015. The consultation activities (between Dec 2005 and Dec 2006) and sectoral plans prepared for the City Development Plan (CDP) under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) provided key inputs in fine tuning the Master Plan.

Based on the directive principles, the Master Plan was developed to address the overall Vision for the city. Bangalore's Vision for the year 2015 as developed during the City Development Plan (CDP) preparation process and adopted by the city's local self government institutions (LSGIs) is *to retain its per-eminent position as a City of the Future through its cosmopolitan character and global presence, and to enable and empower its citizens with: growth opportunities to promote innovation and economic prosperity; a clean and green environment; high-quality infrastructure for transport and communication; wide-ranging services aimed at improving the quality of life for all; conservation of its heritage and diverse culture; and responsive and efficient governance.*

City growth, economic development, environment and energy, people and well being, leisure, art, culture and sports formed the basis for translating the growth scenario and vision into urban space. Emerging from the Vision are the following significant features of the Master Plan:

- (i) Urban Integration. The Master Plan shall ensure that vacant lands in strategic areas are occupied and the spread of layouts minimized. Schemes and programs for new development will integrate natural components. Old neighborhoods in the central area will be redeveloped and a wide range of activities will be promoted along the street facades. Derelict industrial lands with redevelopment opportunities will be developed based on economic potentials.
- (ii) Industries and Services. The Plan will promote the services sector, strengthen and extend existing employment areas along major roads and other clusters such as Peenya, Bommasandra and the Electronic City. Besides these, the Master Plan has identified areas to develop several new industrial/ employment areas focusing on general industrial activities and hi-tech zones.
- (iii) Hawking/Informal Sector. The Master Plan draws from the **National Policy for Urban Street Vendors** and focuses on the Policy's key objectives providing for hawking and including requirement of street vendors into the Plan.
- (iv) Mixed Use. The Master Plan advocates mixed use of land and the policy under the Plan therefore follows a differentiated approach based on the character of the identified regions – subject to the socio-economic status of neighborhoods and their preference to have commercial activities within the neighborhood. In promoting mixed use of land in designated parts of the city, the Master Plan makes adequate provision for meeting community needs, mitigating environmental impacts and providing for safe and convenient circulation and parking.

- (v) Housing and Shelter. In line with the **National Housing and Habitat Policy**, which has the ultimate goal to ensure ‘Shelter for All’ by harnessing the potential of the public, private/corporate and household sectors, the “shelter” provision in the Master Plan aims to ensure effective housing and shelter options for all citizens, especially for the vulnerable groups and the poor, by creation of adequate housing stock. The specific focus of the Master Plan in this regard is on budget housing, redevelopment of slums, and night shelters for migrant labor.
- (vi) Transportation. In line with the **National Urban Transport Policy**, the Master Plan proposes development of a networked city through a sustainable transportation system focusing on development of a structured road network, organizing transportation/logistics facilities and developing a multi-modal public transportation system.
- (vii) Redevelopment of Lakes and Urban Afforestation. The Master Plan advocates projects that include development of recreational spots, fencing, desilting of lakes, diversion of sewage, prevention of garbage dumping in the lakes and initiation of activities such as gardening. Both the BBMP and BDA are planning to develop various parks and playgrounds that would contribute in increasing the current coverage of open spaces from 14% of the total city area to 20% of the city area.
- (viii) Safe Sanitation. The Master Plan provides a strategic outlook regarding safe sanitation and advocates creation and accessibility to safe sanitation facilities by all citizens, increasing public awareness on safe sanitary practice, and ensuring municipal waste management practices conform to the MSWM Rules, 2000, ensuring that appropriate options for wastewater recycling and reuse are introduced to supplement water for non-domestic usage, and storm water runoff is appropriately collected and discharged into natural drainage channels.
- (ix) Water Supply. The Master Plan provides directions for public water supply ensuring that water is accessible to all citizens and that the quality and quantity of water available to citizens conforms to the Central Public Health and Environmental Engineering Organization (CPHEEO) standards.
- (x) Energy and Power. The Master Plan provides a strategic outlook to facilitate uninterrupted quality power supply to all citizens at affordable rates in the BMR, and suggests actions to ensure that the load forecast demand for the BMR meets the proposals indicated in the 11th Five Year Plan (FYP).
- (xi) Urban Community Upgrading. The Plan promotes the concept of basic services to the urban poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery through convergence of already existing universal services of the Government for education, health and social security.

- (xii) Health and Education. The Plan facilitates creation of Bangalore as a centre for medical care and rehabilitation and a centre of excellence in education. While the City would play a facilitator's role by setting the base infrastructure and planning/zoning, the actual service would come from private finance.
- (xiii) Art and Culture. In order to showcase the region's culture and heritage, and more importantly, to preserve the memoirs of Bangalore, the strategic outlook for the sector comprises conservation of all architectural and heritage monuments in Bangalore and promoting Heritage Tourism to showcase the region's history and culture.

While the Master Plan provides the development planning framework for the city and its future growth, existence of various LSGIs, inherent service delivery inconsistencies and overlaps affect the city's development. Within the context of service delivery inconsistencies, overlaps, organizational conflicts, managerial voids, and legal complications, the Master Plan considers the following options: (i) redefining the roles of the major urban authorities in the Bangalore Metropolitan Region, with particular reference to the BBMP, BDA, and BMRDA, to meet the challenges of future metropolitan management; (ii) tackling the managerial voids in the peri-urban/ suburban areas of Bangalore; (iii) introducing necessary legal reforms to meet the new planning and developmental needs of the Bangalore Metropolitan Region; and (iv) ensuring transparent processes, with citizen participation, in the City's planning and governance.

The Government of Karnataka has constituted an Expert Committee for the planned development of the **Bruhat Bangalore Mahanagar Palike (BBMP)** within the above context. The Committee is currently preparing its recommendations on the subject. While the aforesaid committee on BBMP reviews multiplicity of functions and overlaps in service delivery, GoK has formed the **Bangalore Metropolitan Land Transport Authority (BMLTA)** for the Bangalore Metropolitan Region (BMR). The BMLTA shall function as an umbrella organization to coordinate planning and implementation of urban transport programs and projects and provide an integrated management structure to ensure sustainable transportation in the city.

A dedicated Monitoring Unit with modern data processing facilities would be established, which would be responsible for collection and analysis of primary and secondary data and bringing to notice important changes in the Master Plan. This unit would also be in-charge of overall monitoring of implementation of the approved development plans and layout plans. A suitable mechanism by way of a high-level committee under the Chief Secretary, Government of Karnataka is also proposed to be established for periodic review and monitoring of the Master Plan.

I. INTRODUCTION

A. Overview

The technological revolution has resulted in fundamental changes as to how and where people work, live and play in modern day society. This has been coupled with unprecedented growth in certain developed countries and has culminated in the creation of new economies based on service provision. Such change has brought with it challenges commonly associated with unpredicted growth; traffic congestion, urban sprawl, the abandonment of inner cities, poor access to education and a perceived lack of affordable housing.

Bangalore has been substantially affected by globalization and rapid urbanization over the last decade. The demand on services and the quality of life in the city is not confined to the central core or the erstwhile Bangalore Mahanagar Palike jurisdiction but spreads beyond into the peri-urban areas, the Metropolitan Area and outwards, into the Bangalore Metropolitan Region. With the emergence of the Bangalore-Mysore Infrastructure Corridor, the Bangalore International Airport and the planned ring roads, urbanization is no longer confined to the Bangalore Metropolitan Area and has now spread into the Bangalore Metropolitan Region (BMR).

Bangalore has incontestable advantages to develop into an international metropolis but at the same time faces significant constraints. The city is embedded in its history and depicts the greatness of a truly Indian city established before invasions and colonization. It has a diverse set of activities, from silk to aeronautics, from clothing to information technology, and is a gauge of dynamism and solidity of the city. While the city is internationally recognized for information technology, the industrial public sector occupies an important place and ensures a balance between the public and the private sector. The quality of technical training is renowned and constitutes the best support structure for development of advanced technologies and the overall urban structure is coherent; it ensures a good correlation between activities and social classes. Natural drainage, climatic advantage and the availability of water in the Cauvery basin are factors that assist in improving the quality of life in the city.

Despite some undeniable advantages, Bangalore faces a series of constraints that are likely to compromise the durability of its development. The difficulties encountered today constitute, in effect, risk of dissociation between urban growth and the capacity of public authorities to respond in terms of infrastructure, public facilities and a control over the process of urbanization. These constraints are likely to arrest growth and could result in the loss of the status of an international pole, much to the benefit of other cities that have better managed their development. The expansive mode of development uses a lot of space and is costly to equip and encourages the use of individual transport by segregating the space. Urban extensions are not managed and one can find much incoherence between areas. Urbanization is directed by opportunities and land availability; there is neither planning nor even a larger framework. The development of the CBD is blocked and there are inconsistencies in regulation and need for urban planning. While the current regulations try to freeze the situation the city itself is in the process of transformation.

Thus, we have on the one hand the deficiencies that have just been outlined, most importantly the absence of control on development, and on the other, the changing status of the city from a state capital to that of an international metropolis. The question that arises is clear “do the constraints of urbanization jeopardize the city’s passage to the level of an international metropolis?” The answer, which constitutes the conclusion of the diagnosis is “in fact, yes”. Bangalore has enough advantages which could facilitate its passage to the status of an international metropolis and yet, considerable disadvantages to make it fail.

In line with the approach to developing the city into an international metropolis, the current Master Plan adopts a more integrated approach in terms of economic, environmental and societal factors. The Plan incorporates a more cyclical model that accord with the holistic principles of Smart Development and more prudent use of resources. The planning is more participatory, founded on the principles of collaboration and consensus building and scope for all stakeholders to be involved in the decision making process – the planning methodology attempts to ensure that neighborhoods, the city and the region accommodates growth in ways that are economically sound, environmentally responsible and socially supportive of community liveability, now and in the future.

B. What is the Master Plan?

The Bangalore Master Plan articulates a multi-year vision and plan for Bangalore’s future growth and development, driven by institutions that reflect its citizens' values. The Master Plan provides the contours of a shared vision and identification of key issues facing the city in the short, medium and long-term. It identifies development patterns, infrastructure gaps and deficiencies, project and reform priorities and an implementation schedule that would be both fiscally realistic and innovative. In order to execute the plan, it recommends institutional mechanisms for the short-term while laying the basis for systemic reform over the medium and longer terms.

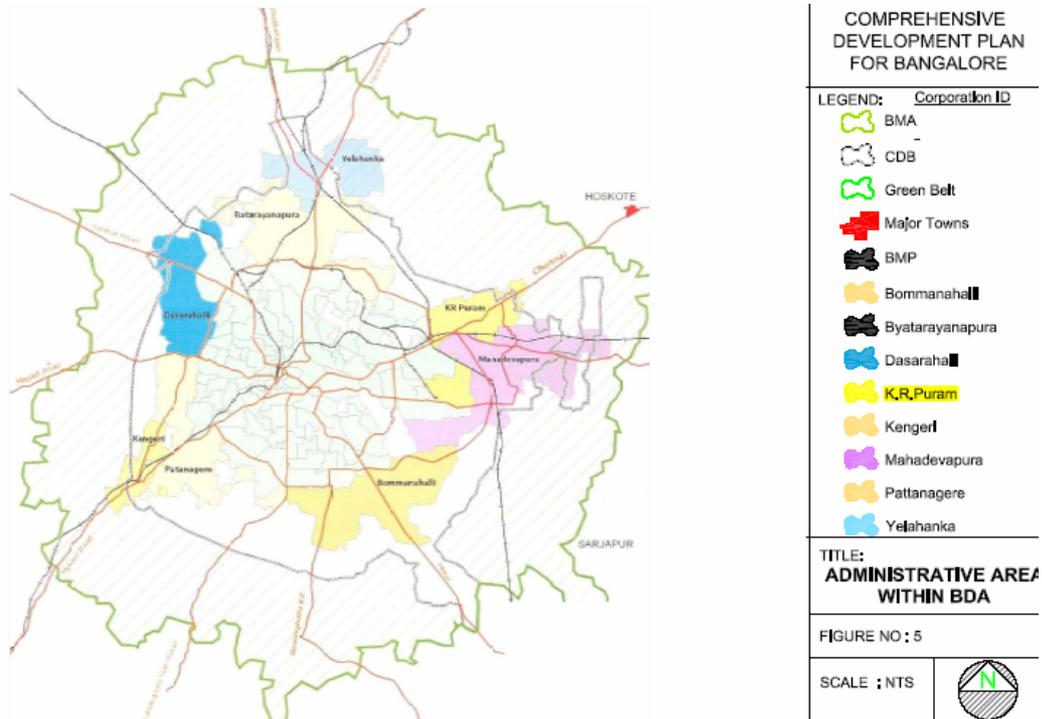
The Master Plan, 2015 for the Bangalore Metropolitan Area¹ (**Figure I-1**) is a statutory document that identifies growth perspectives, develops land use plans addressing the urban agglomeration area’s growth, and lays out Development Control Regulations (DCRs) to regulate the city’s development. The provisions of Section 13 D of the Karnataka Town and Country Planning (KTCP) Act, 1961 mandate that the Master Plan for the Local Planning Area (LPA) of Bangalore shall be revised once in 10 years. The previous Comprehensive Development Plan was prepared in the year 1995 to meet the plan period ending 2011, which was approved by the Government of Karnataka (GoK) vide order no: HUD 139 MNJ 94 dated January 5, 1995. The current revision of the Master Plan serves a plan period ending in the year 2015 and is referred to as the Revised Master Plan 2015 (RMP 2015).

The Master Plan also collates the sectoral plan for urban basic service delivery in the city

¹ The Bangalore Metropolitan Area (BMA) covers an area of 1307 sq. km and comprises the Brahut Bangalore Mahanagar Palike, surrounding villages and the Bangalore-Mysore Infrastructure Corridor Project Area (BMICPA).

– addressing service delivery, and associated institutional reforms for services provided by local self government institutions (LSGIs) in the city. The sectoral plans are detailed in the City Development Plan document prepared for financing under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) – see Box 1.

Figure I-1: The Bangalore Metropolitan Area



Box 1: The Jawaharlal Nehru National Urban Renewal Mission

Recognizing the critical importance of rapid urban development and growing contribution of the urban sector to the Country’s GDP, the Government of India through the Ministry of Urban Development (MoUD) launched the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in December 2005, with the objective of addressing urban infrastructure and governance, and provision of basic services for the urban poor in Indian cities. JNNURM is a reform-driven and fast track project, planned at developing identified cities focusing on efficiency in urban infrastructure/services delivery mechanism, community participation and accountability of Urban Local Bodies/Parastatals towards its citizens.

The proposed duration of the Mission is seven years (2005-12) and includes an outlay of approximately Rs. 1,000 billion, covering 63 important cities in the Country. As an initial requirement to access funding through JNNURM, the Mission requires cities to prepare City Development Plans (CDPs), which will consider city needs in an integrated and participatory manner, and prioritize investments, in urban infrastructure, housing and basic services for poor.

The CDP is a common vision shared by city-level stakeholders determining how the city should grow, the quality of life citizens expect, and the role of stakeholders (government, parastatals, industry, non-governmental organizations, and citizens) in ensuring that the common vision is attained and within a specified timeframe. On the basis of the CDP a tri-partite Memorandum of Agreement (MoA) between the Government of India, State Government and the ULB will set out a joint commitment to reform and define the responsibilities of different agencies. Gol’s stance is that JNNURM funding will be released only when cities and states meet their obligation under the MoA.

C. The Master Planning Process

The preparation of the Master Plan in partnership with the community through a consultation and participation process began in the year 2003 and identifies the city's Vision in the long-term. Citizens, organized groups of stakeholders, and local, state and national officials were consulted at several stages during the preparation of the Master Plan. The consultation process involved various stakeholders – city's political planning partners (Mayor and Councilors), city's key stakeholders (business groups, academicians, state-level utilities), and community planning partners (citizen representatives and members of community based organizations).

The Master Plan drew from various reports and documents prepared for the specific purpose of developing the Master Plan, 2015 and were adequately supported through data and information from baseline – primary and secondary – surveys. Field investigations and information provided by Government and parastatal institutions formed key inputs to the Master Plan. An Advisory Committee gave its recommendations on the Draft Master Plan in November 2005; recommendations of the Committee have largely governed the output of the Master Plan, 2015. **Table I-1** provides key milestones and dates in the evolution of the Master Plan, 2015 document.

Table I-1: Evolution of the Master Plan

Master Plan Milestones	Key Dates
Commencement of Master Plan exercise	Jun 2003
Existing Land Use surveys	Jun-Dec 2003
Consultation meetings	Jun 2003-Jun 2005
Master Plan Development	Jan 2004-Jun 2005
Draft Master Plan released to Public	Jun 2005
Report of the Advisory Committee	Nov 2005
Announcement of the JNNURM	Dec 2005
Commencement of CDP exercise	Mar 2006
Consultations under the CDP exercise	Apr-Jun 2006
Preparation of Sectoral Plans for approval under JNNURM	Jan-Dec 2006
Revised Master Plan (incorporating Sectoral Plan and Advisory Committee recommendations)	April 2007

D. Community and Partnerships

Drawing from the consultative process, the Master Plan has significant implications for economic and social development, urban environmental management, and governance. Successful implementation of the Master Plan will therefore require the commitment of many organizations and individuals, as well as the LSGIs. To achieve this, the LSGIs will enter into Partnership Agreements with the organizations that will have a key role in ensuring that goals and desired outcomes for Bangalore are achieved. At the community level, residents will also need to become more involved in activities that will assist in achieving the desired outcomes for the city. Information, education and communication

(IEC) programs will be developed aimed at building the capacity of the people and the community to take an active role in addressing the city's Master Plan cornerstones of sustainable development – economic, social and environmental development.

E. Structure of the Master Plan

1. Documents

The Master Plan comprises five volumes of documents that should be read together. The documents are:

- **Volume 1: Vision Document.** This report covers the key principles of the Revised Master Plan 2015 and the Vision detailing the principles of macro zoning and proposals envisioning the city by 2015. A series of maps/graphics have been included to explain the approach.
- **Volume 2: Proposed Land Use Plan.** The proposed land use plans are in scale of 1:5000 within the ring road mainly covering the erstwhile Bangalore Mahanagara Palike limits and in scale of 1:10000 in the periphery.
- **Volume 3: Land Use Zonal Regulations.** The land use zonal regulations define the development control and regulations zone wise, with respect to the permissible activities and the FAR.
- **Volume 4: Planning District Report.** The Planning District Report addresses all 47 Planning Districts and contains the analysis, observations and proposals for each area. The recommendations and proposals covering land use and transportation along with identified projects are covered.
- **Volume 5: Existing Land Use Maps.** The maps contain the land use of existing developments in the city as mapped in year 2003.

2. Structure the Vision Document

The Volume 1 of the Master Plan is laid out into the following sections:

- Introduction;
- Economy, Growth and Service Delivery: Trends;
- Directive Principles;
- Strategic Interventions;
- Implications on Urban Development;
- Land Use and Zonal Regulations; and
- Plan Review and Monitoring.

II. ECONOMY, GROWTH AND SERVICE DELIVERY: TRENDS

A. Economic Development

1. Economy

Bangalore experienced rapid growth in the decades 1941-51, and by 1961 Bangalore became the sixth largest city in India. Employment opportunities – initially in the public sector, and then in textile and high technology industries – resulted in migration of people to Bangalore. The growth of Bangalore from a town to a metropolis has been a result of five growth events:

- Shifting of the State Capital from Mysore;
- Establishment of the Cantonment;
- Setting up Public Sector Undertakings/Academic Institutions;
- Development of Textile Industry; and
- Development of Information Technology/ITES/Biotech based industries.

Economic development of Bangalore is apparent in the variety of manufacturing and service industries that are key contributors to its growth. Bangalore's US\$ 47.2 billion economy makes it a major economic centre in India, and as of 2001 Bangalore's share of US\$ 3.7 billion in Foreign Direct Investment (FDI) made it the third highest recipient of FDI for an Indian City. Industrial / commercial employment is the highest in the city at over 90% while employment avenues in the rest of the sectors are relatively minor. The State's Industrial Policy (2006-2011) provides further impetus to the city's socio-economic growth by providing guidelines on strengthening the manufacturing sector, increasing national exports from Karnataka, and promoting diversified industrial base in the city and State.

2. Services and Employment

In addition to prominent industry names and Fortune 500 companies operating out of the City, there are a large number of small and medium size industries that contribute significantly to the economic base of Bangalore. Industry turnover and employment base in various categories of industry is illustrated in **Table II-1**.

Table II-1: Industry Turnover and Employment (2003)

Size	Number	Investment (Rs. million)	Job Opportunities
Small-scale	55,162	16,820	578,000
Medium & Large Scale	546	47,250	224,287
Mega	17	38,080	33,830

Source: JNNURM CDP.

Given the above scenario, industrial/commercial employment is obviously the highest, at over 90%, while employment avenues in the rest of the sectors are relatively minor. Further substantiation is illustrated in **Table II-2**.

Table II-2: Occupational Pattern

Sector	No. of Workers	% of total
Primary Sector	5,000	0.80%
Manufacturing	254,000	43.36%
Electricity, Gas and Water Supply	8,000	1.40%
Construction	6,000	0.99%
Transport, Storage and Communication	43,000	7.29%
Banking and Insurance	65,000	11.07%
Trade and Business	21,000	3.59%
Services	184,000	31.51%
Total	585,000	100.00%

Source: JNNURM CDP.

3. *Employment and Social Context*

The distribution of economic activities in the city reflects its history, its different stages of development as well as the underlying socio-spatial contexts. Several distinct areas or spatial groups emerge from the geographical distribution of activities in Bangalore. These spatial groups are:

- The **“Old Petta”**, the **historical heart of the city**, constitutes even today a very important centre of trade (wholesale and retail activities). This core area includes Chickpet, Cubbonpet and other areas with traditional activities focused on silk, garments and jewellery among others. It is an important nerve-centre for a majority of working-class people. This area is flanked by Binnypet, Cottonpet and Srirampuram in the North-West which have informal trading and retail activities related to transport services and agarbathi manufacturing. To the **North of the Old Petta** lies Cubbon Park with the State’s administrative centre, and other large public facilities and universities.
- In the **North-East**, Shivajinagar and Russell Market form a second commercial hub in the Cantonment area. Along the far eastern part of MG Road are the banks, head offices of companies and hotels, which constitute the embryo of the city’s Commercial (Business) Area.² Around this area, are

² One of the key elements of the city diagnosis is the decline of large industries (Binny Mills, Minerva

located large industrial establishments of the city especially in the North and East, which includes the large public sector units of Hindustan Aeronautics Ltd, ISRO, and BEL, which were established after the Second World War. In the **North-West** the Peenya Industrial Estate, that stretches out along Tumkur Road, has contributed to the city's growth. Implemented at the beginning of the 1970s to promote traditional small-scale industries, this estate is losing its momentum today.

- In the **East**, the Chennai railway line and Whitefield Road are important corridors. Along these corridors, in the Whitefield area, the EPIP was developed in the 1990s to promote the development of IT and it includes the International Technology Park Ltd. (ITPL). These corridors also support logistic infrastructure facilities including an oil terminal and the CONCOR terminal.
- In the **South-East**, Hosur Road constitutes a dynamic axis of industrial development and employment and serves as an important link to Hosur Town in Tamilnadu. Along this road, the Electronic city area has large Public and Private software and IT enterprises while the Bommasandra area supports industries oriented towards traditional activities.

Between these clearly defined different ensembles, there are urban sectors and residential functions, services, and manufacturing activities (silks and garments) co-existing and often functioning in an informal manner. A geographic mapping of the 1991 data on distribution of jobs and employment based on the place of residence, within the BMP area, displays three large spatial groups:

- In the **western zone** of the city, from the Mathikere area in the North up to Chandra Layout in the South including the areas near the Bangalore Central Railway Station, there are residential areas with households that are mostly employed in the manufacturing sectors, particularly in Peenya, Chickpet, Binnypet and Cottonpet, and along Mysore Road.
- Those households engaged in trade and business form a **North-South axis** starting from Chickpet, the business centre of the city, including the areas along Kanakapura Road, and up to Jayanagar and JP Nagar. This group is also found in the Shivajinagar and Russel Market area.
- Those households employed in services, administrative and public service, are mainly located in the **North and East** of the city in Malleshwaram, Kamanahalli, Indiranagar and the areas near the Domestic and International Airport.

Mills, Kirloskar, NGEF and others) within the BMP limits. This decline reflects the difficulties faced by certain traditional activities in a changing economic environment. The old dilapidated and derelict industrial areas constitute a noteworthy opportunity for urban renewal (land recycling).

B. Urban Growth

1. Population Growth

The Census 2001 population for Bangalore indicates a population of 5.7 million and the Master Plan, 2015 estimates the Bangalore Metropolitan Area (BMA) population as 6.1 million (including peri-urban and rural settlements). The annual growth rates for Bangalore indicate high trends relative to other cities in the country – at 3% for the total population; 6% for employment; and 9% for the incomes – and the emergence of Bangalore as a leading metropolitan city of India. Besides the well known developments in the IT, science, engineering, industrial and education fields, the city is fast emerging as a specialized centre for health care and a centre for high-end research and design.

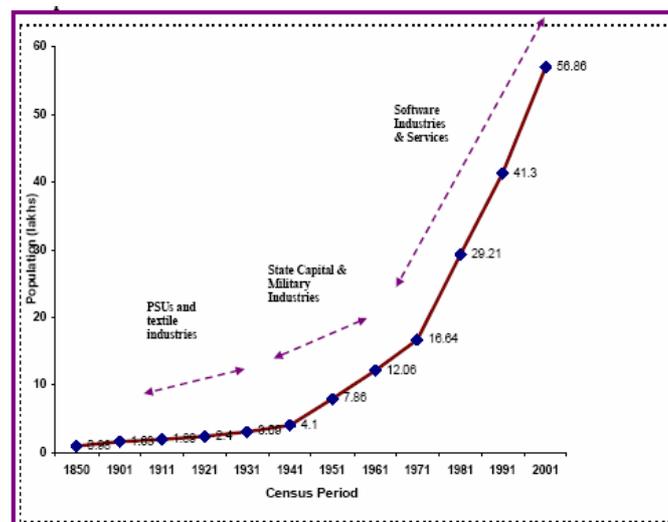
Table II-3: Composition of Population Growth

Composition	1981-1991 (million)	% of Total	1991-2001 (million)	% of Total
Natural Increase	0.266	22%	0.342	22%
In-migration	0.544	45%	0.700	45%
Jurisdictional Change	0.403	33%	0.519	33%
<i>Total Increase</i>	<i>1.209</i>	<i>100%</i>	<i>1.557</i>	<i>100%</i>

Source: JNNURM CDP.

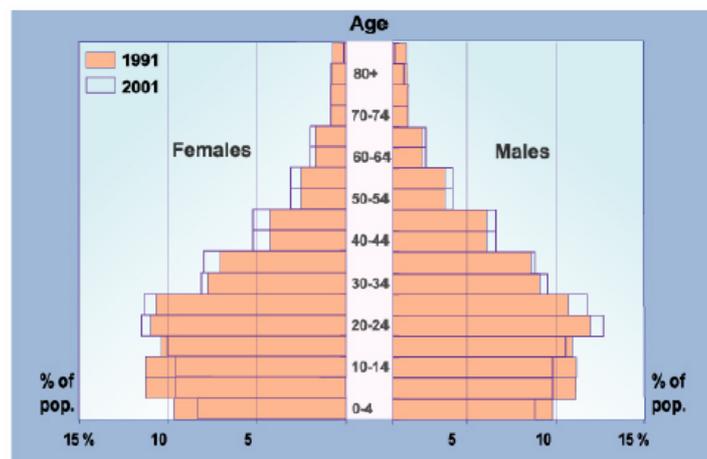
A commonly accepted fact about the evolution of a city is that migration plays an important role in the growth of its population, however in case of Bangalore; over 60% of its growth comes from natural growth. The migrant population constitutes about 25%. The large proportions of the migrants are well educated and qualified. The population growth trend in the city is indicated in **Figure II-1**.

Figure II-1: Population Growth Trends



The age-wise demographic profile of Bangalore's population between 1991 and 2001 presents marked change leading to a decrease of 0-6 child population, the number of adults between 20 and 29 years remain constant and a significant growth of all social classes above 40 years. This profile shows a marked domination of people in the age group that have the capability of being gainfully employed (15 to 50), which underlies the strong attraction that Bangalore exerts and its influence over this age group sustained by migration and longer life expectancy.

Figure II-2: Bangalore's Demographic Profile

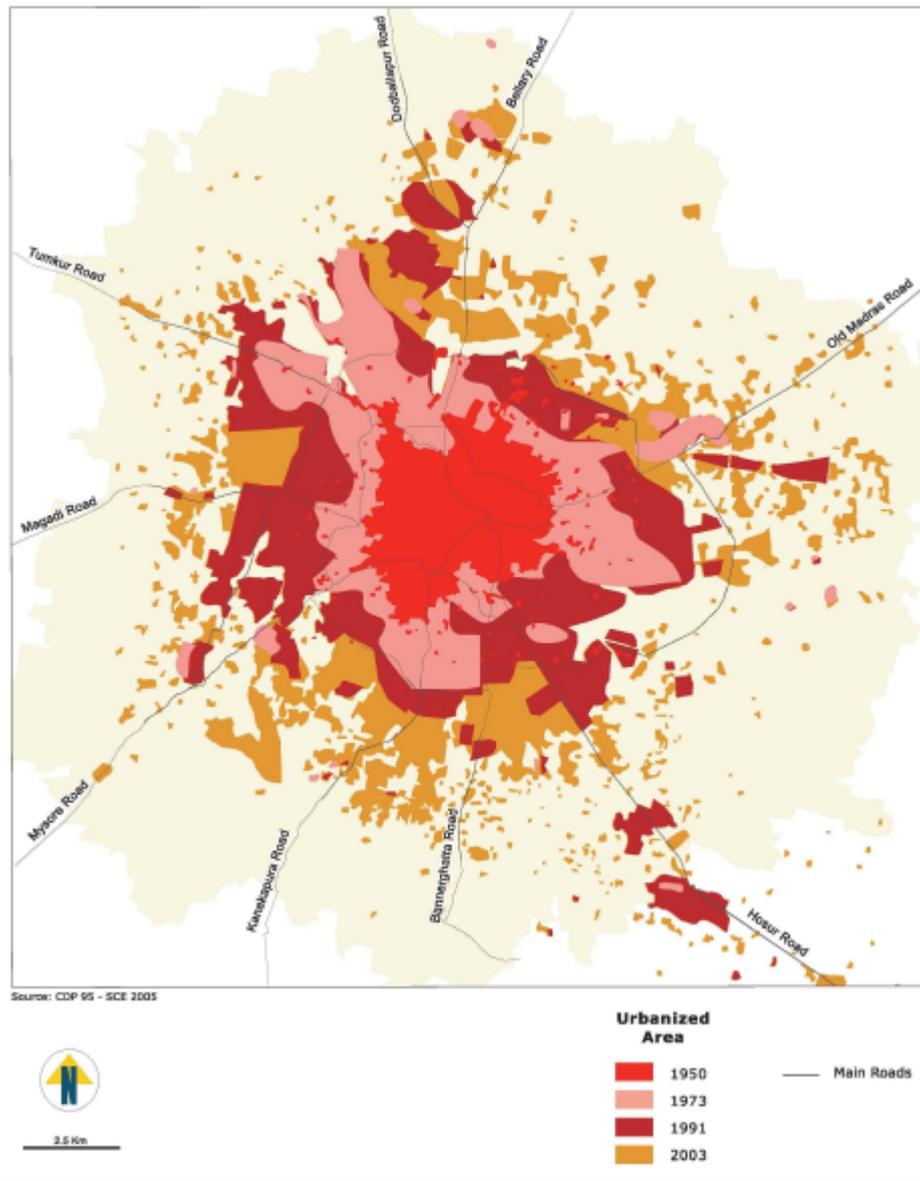


2. Spatial Growth

Economic, social and population growth translated into spatial development of the city indicates an urban form of Bangalore (refer **Figure II-3**) that is characterized by a radio-concentric system structured by **ring roads**, **five major radial roads**³ and **five secondary radial roads**⁴ that converge towards the centre of the city. The major and secondary radial roads that form a ten-pointed star constitute the organizational system of the city, and are important as they support both industrial and commercial development.

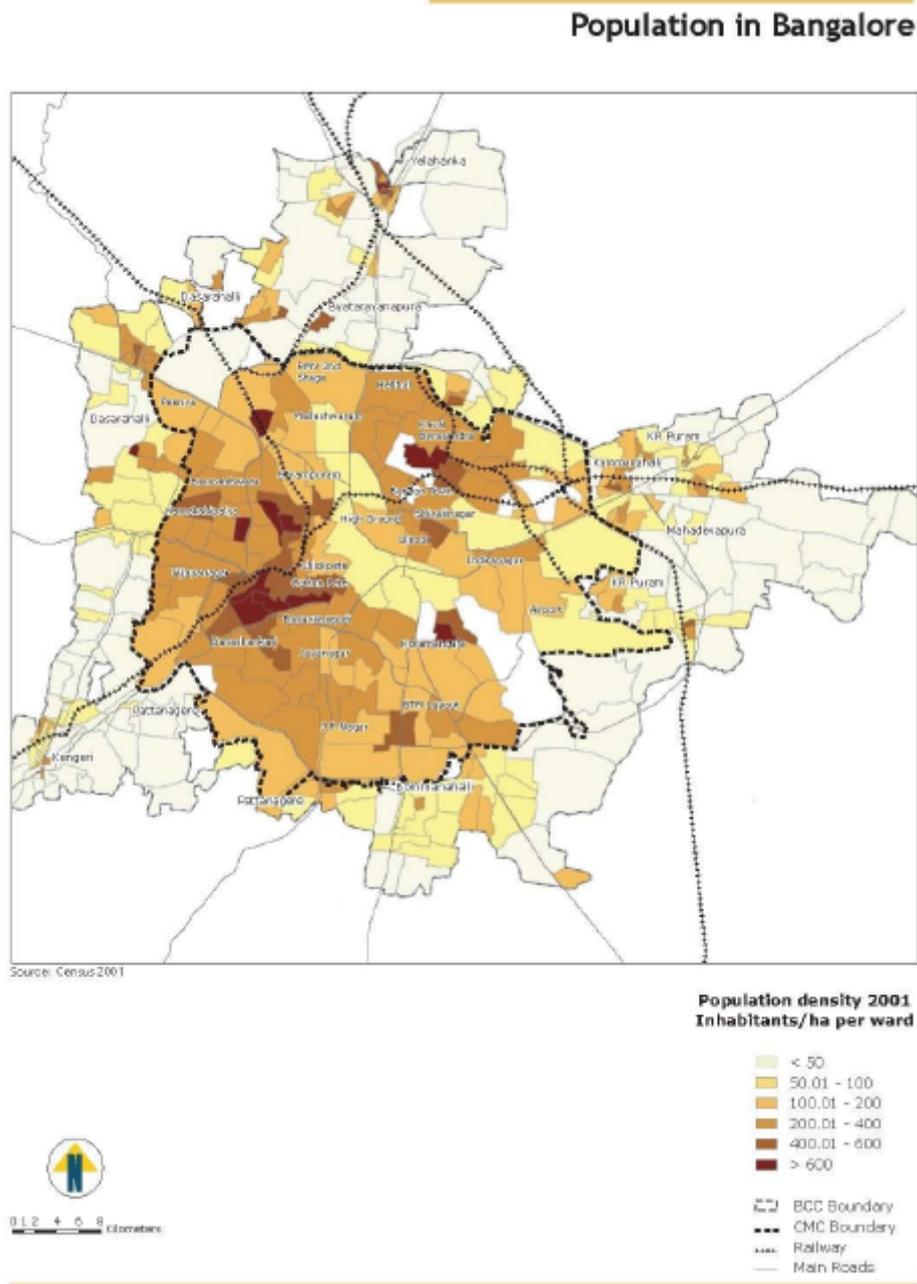
³ The five major radial roads are Mysore Road (SH-17) in the South/South-West, Old Madras Road (NH-4) in the North/North-East, Bellary Road in the North, Hosur Road (NH-7) in the South-East, and Tumkur Road in the North-West.

⁴ The five secondary radial roads are Magadi Road (SH-17E) in the West, Kanakapura Road (NH-209) in the South, Bannerghatta Road (SH-48) in the South, Varthur Road in the East, and Whitefield Road (SH-37) in the East.

Figure II-4: Bangalore's Urban Sprawl

The urban form and sprawl has implications on the overall density in the city at 107 persons/Ha, which is a relatively medium figure (refer **Figure II-5**). The density calculated for only the residential area in the city is approximately 300 persons/ha, a relatively high density occurring due to the high rate of land utilization in the residential areas and the size of the large vacant public lands in the city. Within the old BMP area the overall density increases to 191 persons/ha, a very high figure justified by the intensity of land utilization in the urbanized areas. The density in the city's core area has not increased between 1991 and 2001, an occurrence that is attributed to the reduction in the size of households, competition between trade and housing in the core area and transfer of the growth in population to the erstwhile City Municipal Councils and the Town Municipal Council (now a part of the BBMP).

Figure II-5: Bangalore's Population Density (2003)



3. Land Use

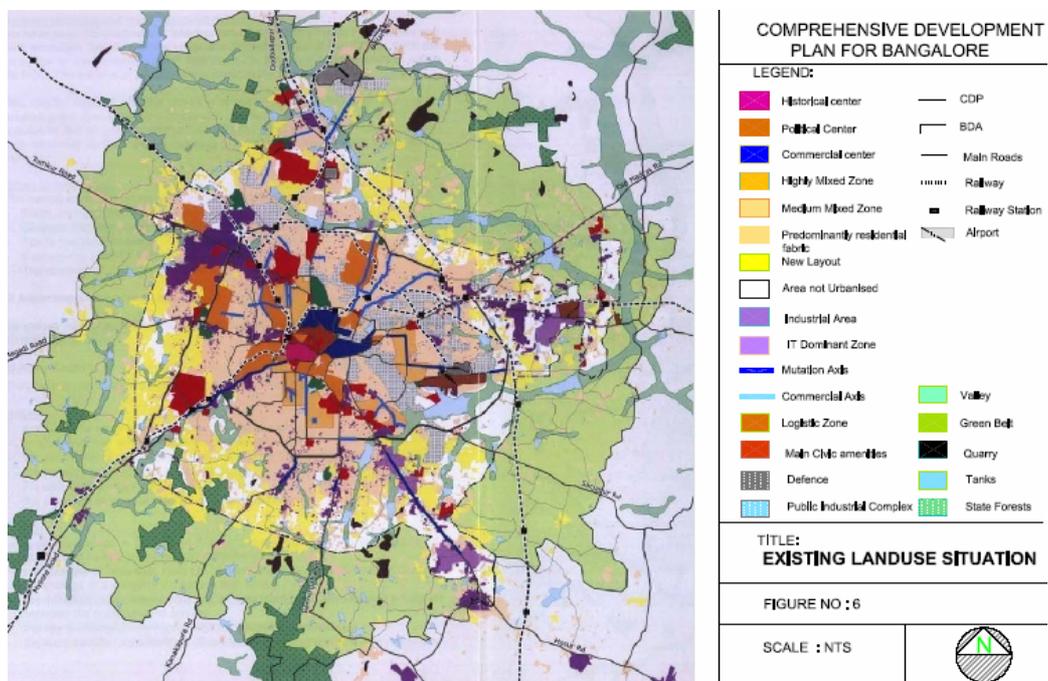
A comparative assessment of the land use in Bangalore is detailed in **Table II-4** and the existing land use in Bangalore, based on surveys conducted in 2003, is indicated in **Figure II-6**.

Table II-4: Land Use

Land Use	Proposed Land Use (2011) sq. km	Distribution	Existing Land Use (2003) sq. km	Distribution
Residential	243.69	43.16%	159.76	37.91%
Commercial	16.43	2.91%	12.83	3.04%
Industrial	38.44	6.81%	58.83	13.96%
Open spaces	77.88	13.79%	13.10	3.11%
Public and semi-public uses	49.08	8.69%	46.56	11.05%
Public utilities	-	0.00%	2.49	0.59%
Offices & Services	-	0.00%	4.27	1.01%
Transport and Communication	116.97	20.72%	88.31	20.96%
Unclassified	22.14	3.92%	35.26	8.37%
Total	564.63	100.00%	421.41	100.00%
Agriculture Land			649.24	
Lake and tank			39.02	
Quarry			9.61	
Vacant			187.72	
Total	564.63		1,307.00	

Source: BDA.

Figure II-6: Bangalore's Existing Land Use (2003)



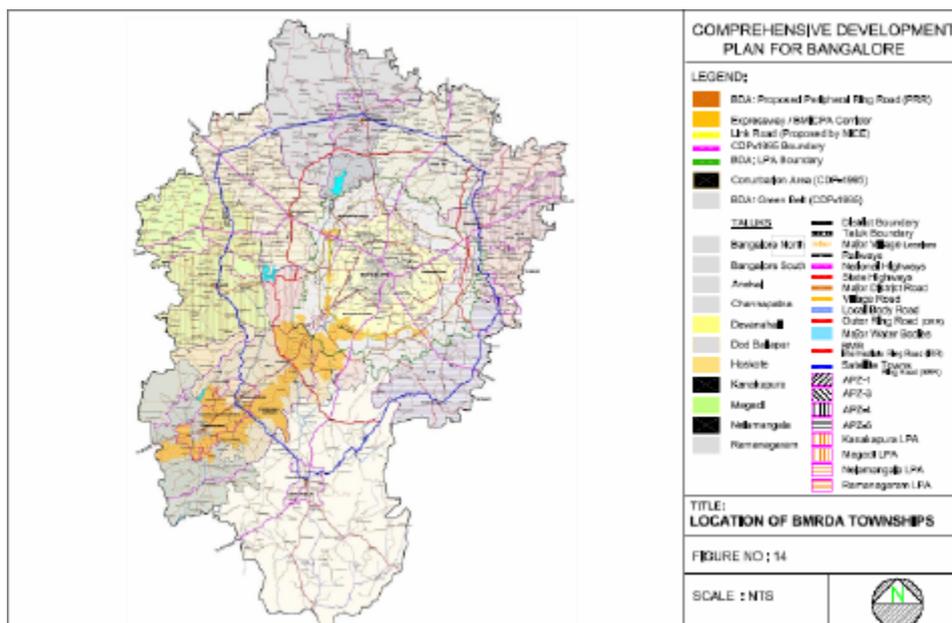
4. Factors influencing Bangalore's Growth

In addition to Bangalore's rapid socio-economic development that has had a significant impact on the urbanization in the city, future growth is governed to a large extent by the development patterns in the Bangalore Metropolitan Region (BMR). Key projects influencing socio-economic development in the city and peri-urban area comprise:

- Bangalore International Airport (North Bangalore);
- Bangalore-Mysore Infrastructure Corridor (South-West Bangalore);
- Information Technology (IT) Corridor (South-East Bangalore);
- Bangalore Metro Rail (cross-cutting Bangalore City);
- Location of large-scale/manufacturing industries (East and North Bangalore);
- Location of IT/ITES/Biotech Industries (East and South Bangalore);
- Development of five Integrated Townships in the BMR;
- Responsive energy and power supply projects;
- Proposed Peripheral Ring Road (around Bangalore); and
- Urban basic service delivery projects proposed by the local self government institutions (LSGIs) in the city (funded through the Jawaharlal Nehru National Urban Renewal Mission).

While the Government of Karnataka (GoK) has constituted a committee to review the administrative structure and legal framework to address urban growth and management in the BMR, the Master Plan provides a responsive approach to addressing urbanization and governance structures to regulate and guide Bangalore's growth over the next decade leading through the year 2015.

Figure II-7: Bangalore Metropolitan Region – Influencing Factors



C. Implications on Service Delivery

Industrialization and economic development in Bangalore and the region has brought with it tremendous stress on the state of infrastructure in the city, as witnessed by its quality of life and the status of urban basic services. Poor water supply, growing vehicular pollution, discharge of untreated wastewater into natural drains, and lack of comprehensive city services planning are few issues the city is faced with today. Besides economic factors that influence urbanization in the city, access to urban basic services is a key determinant for establishing industry and citizen's choice for residence. There is a perceptible shift in citizen's preference for urban basic services apparent in citizens locating themselves in the city's periphery – push factors comprise narrow city roads within the old city area causing traffic congestion; and pull factors comprise access to quality education and medical facilities, and provision of quality infrastructure in newly merged areas. The implications on service delivery is governed by three significant factors – the roles and functions of institutions involved in service delivery, the planning instruments available to regulate growth and facilitate service delivery, and the approach to long-term city development.

1. Institutions Involved

Various local self government institutions are responsible for addressing the city's growth, and include: Bruhat Bangalore Mahanagar Palike (BBMP), Bangalore Metropolitan Transport Corporation (BMTTC), Bangalore Development Authority (BDA), Bangalore Water Supply and Sewerage Board (BWSSB), Karnataka Slum Clearance Board (KSCB), ITBT, Bangalore Metropolitan Region Development Authority (BMRDA), Karnataka State Road Transport Corporation (KSRTC), Heritage Board, Karnataka Housing Board (KHB), Bangalore International Airport Area Planning Authority (BIAAPA), Tourism Department, Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), and the Bangalore Electricity Supply Company (BESCOM).

The presence of multiple agencies brings with it various systemic issues associated with aforementioned institutions (issues comprise multiplicity of agencies, planning for service delivery, organizational development and accountability, etc.) that have impacts on the manner in which service is delivered in the city.

2. Planning Instruments

Currently, the key planning instrument addressing the city's development is the Master Plan 2015, for the BBMP and surrounding area (BMA) jurisdiction. The Master Plan, 2015 is responsive to the aforementioned imminent growth and provides for land use allocations and Development Control Regulations (DCRs) to regulate urban development. It also provides for an increase in space allocation for circulation and recreational activities addressing better space planning and improving the quality of life in the city. While the Master Plan is prepared once in 10 years and addresses physical/spatial planning issues, the urban basic service delivery is planned by the BBMP, BMTTC, BWSSB and other LSGIs, which responds to growth demands within its jurisdiction.

Consequently, there is no long-term planning vision for spatial growth and service delivery with a common objective of addressing the quality of life. Infrastructure planning for the city's future bearing in mind peri-urban development requires a holistic approach and necessitates planning by a single entity that appreciates the effects of service delivery within the current jurisdiction and the consequent impact on the quality of service on expanding the planning and service delivery horizon.

The Master Plan exercises of planning bodies such as the BDA and the BMRDA were related largely to land use plans. The objective of the Master Plan, 2015 document is to achieve integration of spatial, economic, social, transportation, and ecological planning. It includes new concepts relating to town planning, land use controls, and management of urban fringes. From a long-term developmental perspective, the Master Plan, 2015 takes cognizance of the below-mentioned issues:

- The Karnataka Town and Country Planning Act is nearly 30 years old and is out of tune with modern developments, to meet the future needs of urban growth. It is, therefore, necessary to have a single comprehensive legislation that deals with all aspects of urban planning including regional planning.
- The hierarchical relationships between various institutions (municipal and non-municipal) should be brought out with a view to eliminating overlapping jurisdictions and conflicts.
- Necessary legal support must also be provided to implement the new strategy proposed to overcome the deficits in economic, social, and civic infrastructure. This would involve amendments to certain existing laws like the Land Acquisition Act.
- Management of ecology/environment should also form part of planning a metropolis. Although there are separate central laws to deal with pollution air, water, and environment it would be useful to include suitable provisions in the State Planning Act, as it would make the implementation of these laws more effective.
- Similarly, policies relating to industrial location, including phasing out obsolete industries, and recycling of industrial lands, must form part of planning legislation. The aim is to integrate these fragmented components, into the urban planning process, so that there is a unified approach to planning of the Bangalore Metropolitan Region.

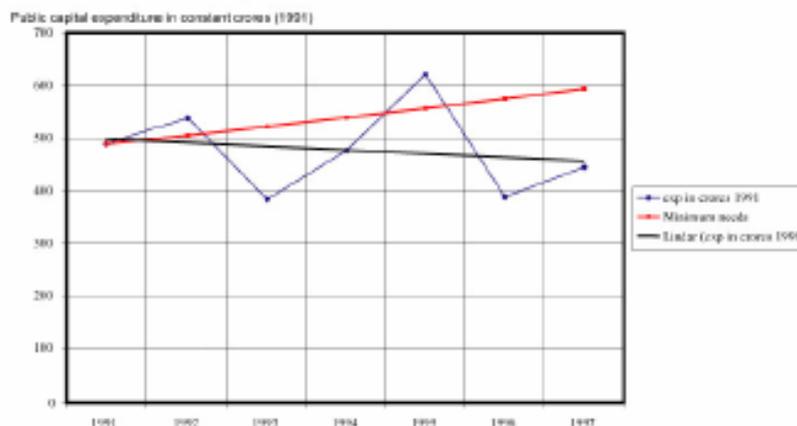
3. Status of Service Delivery

Hence, in moving towards a comprehensive Master Plan, the current Plan (2015) critically evaluates the levels of service in the city and progressively builds up a Master Plan that ties together spatial growth and economically viable urban basic services. The growth of City is led by the dynamics of its rising economy. The current trend observed points towards slower realization of urban infrastructure compared to the growth rate and overall demand (in terms of potable water, housing, electricity, roads and service delivery). This has impact on quality of life of general public and resulted in a spatial mechanism of expansion that is not in line with the societal needs. The annual spatial expansion growth rate of built area over a period of thirty years was 5.4%. This signifies that the growth rate of public financing of urban infrastructure should be higher than this figure, considering the fact that the more a city grows, the higher will be its infrastructure

and working costs per person.

Data concerning urban public investment (BCIP Survey) for the period 1991-97 is shown in the **Figure II-8** below where the blue curve represents the evolution of investment by public bodies, while the red one represents the tendency for minimal level of needs. In constant prices it shows for expenses an uneven curve, with a downward trend for the entire period of investments of 2% per year. This displays an ever-growing gap between infrastructure needs and investment through the years. There is therefore an established need for an increased investment in the public infrastructure and developmental activity.

Figure II-8: Divergence of Public Investment



(Source: Investment by public agencies on infrastructure/development works - BCIP survey)

While infrastructure in the City is reasonably good in some aspects (water and sewerage, for instance), it is under stress in other aspects, particularly urban transport. Qualitatively, the urban infrastructure situation is profiled in the following:

- **Water Supply.** The availability of raw water at about 140 lpcd is adequate, though the draw distances are increasing progressively. UFW is high, and distribution is uneven – being better in the BBMP core area and poor in the peripheral areas.
- **Storm Water Drainage.** Drainage is an area of concern, with the natural drainage system (Valleys) being built upon.
- **Transport.** Rising traffic congestion is one of the key issues in the City. Though the length of roads available is good, the problem lies with the restricted widths. BMTCL is one of the best bus transport corporations in the country, but the absence of a rail-based commuter system compounds the problem.
- **Solid Waste Management.** Collection and transportation coverage is very good, but proper and adequate treatment/ disposal facilities are lacking.
- **Green Areas and Water Bodies.** The City has a tradition of being a “Garden City” with plenty of green spaces and water bodies. However, the very high growth rate in the past two decades is having an adverse impact on these.

A status of the urban basic service delivery in the city is detailed in **Table II-5** and provides a snapshot of sectors comprising water, sanitation (solid waste management, sewerage and urban drainage), urban roads and transport, parks and lakes.

Table II-5: Summary of Infrastructure Status

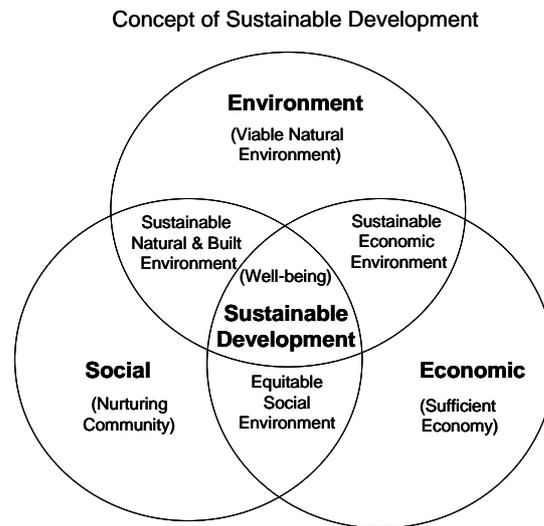
Sector	Parameters	Current Service Levels	Future Service Levels
Water	Coverage Quantum of water supply available Average daily per capita water supply Estimated UFW Frequency of water supply	BMP 100% CMCs & TMC 10-60% 995 mld 73 lpcd 39% 3-5 hrs on alternate days	BMA 100% 100 lpcd 20% 8 hrs per day
Sewerage & Sanitation	Coverage Disposal (Sewerage Capacity) Present operating capacity Wastewater generated daily	225 sq. km area (mainly BMP) 40% of total areas 408 mld 306 mld (75% capacity) 721 mld	75% BMA 100%
Solid Waste	Coverage Waste Generated Waste Collected Collection Efficiency Segregation Treatment & disposal Facilities	100% in BMP Area 3,395 TPD 2,715 TPD 80% 10% (practiced in few locations) Treatment facilities for 1,000 TPD/ landfill facilities being constructed	100% BMA 100% 85%
Roads	Quality Length of roads in BMP area Length of arterial roads Length of NH and SH Length of roads in ULBs No. of Streetlights	80% tarred 3,500 km 250 km 100 km 2,400 km 250,000	100% Surfaced Roads
Transport	No. of registered vehicles No. of buses (BMTC owned) Daily passenger trips Congestion Noise decibels Average speed of vehicles No. of accidents	2.3 million 3,300 3.2 million Exceeds 1 in 52 corridors/links Above 80 in most areas (beyond permissible levels) 12-18 kmph 7,575 (in 2005) 3,654 (unto 30-Jun-06)	
Parks	Coverage area Four important parks Small Parks Well developed Partially developed Not developed	14% Lalbagh, Cubbon Park, Bannerghatta National Park, Dhanvantarivana 365 55 105 180	20%
Lakes	Coverage Area	3% of the total CDP area	

Source: JNNURM CDP.

III. DIRECTIVE PRINCIPLES

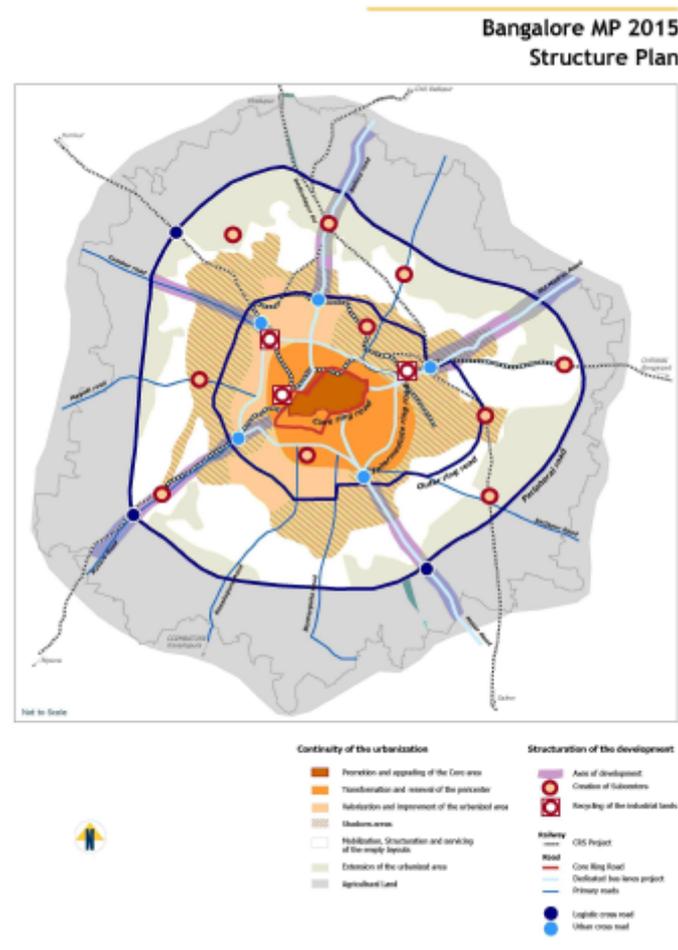
A. Long-term City Development

The issue regarding the city's long-term development is therefore beyond spatial and infrastructure planning and is associated with long-term "sustainable development". While the city's spatial growth defines the framework for service delivery and governance actions, from a larger perspective, the Master Plan will address the cornerstones of sustainable development – economic, social and environmental development. The Master Plan therefore proposes to address long-term sustainable development through the following directive principles:



- **Nature.** Natural and hydraulic balances must be respected allowing controlled urbanization in plateau areas and also the management and usage of ground water.
- **Economic Efficiency.** Economic competitiveness to facilitate quality spaces for the service sectors, industrial activity, advanced technology training and distribution of transport and logistic facilities must be achieved.
- **Social Equity.** The principle of equal access to infrastructure facilities, public transportation and safe decent houses for the economically weaker sections must be ensured.
- **Historical Heritage.** Rapid changes and economic activity need to be monitored and managed so that the Bangalore's heritage is conserved.

Based on the above directive principles, the Master Plan was developed to address the overall Vision for the city. The governing concept of the Master Plan is to ensure "structured continuity" in the Bangalore Metropolitan Area through: (i) selective extension of urbanization, while preserving large parts of the Green Belt; (ii) access to new extensions through the Peripheral Ring Road; and (iii) renewal of areas already urbanized. The governing concept is based on the Structure Plan for BMR, which is a conceptual diagram that serves as a framework for future development of the city. Read as a juxtaposition of two major urban patterns: the ring structure and the radii concentric structure, the Structure Plan envisions that development in the city will be spatially organized using these structures and will occur at certain centres or focal points at the intersection of these structures (refer **Figure III-1**).

Figure III-1: Structure Plan for BMA

B. Growth Scenario and Urban Space

1. Growth Scenario

Developing various growth/development scenarios in a planning process is an important step in the making of a Master Plan as it allows the Authority in-charge to make choices concerning the major directions for spatial development and growth of the city. Six possible scenarios were formulated and evaluated based on the following two basic considerations:

- **The Agricultural Zone (Green Belt).** The Agricultural Zone played a very useful role in limiting urban sprawl. The first important alternative is how much of Agricultural Zone (green belt) is to be maintained in order to accommodate the or not, with the understanding that there can be intermediary formulae.
- **Mode of Transportation.** Two concepts regarding transportation were developed: (i) continue the present system of road transportation; and/or (ii)

utilize the railway network⁵ as a support system of a dense urbanization.

The urban scenarios were mapped for a period of about twenty years with the area considered for the preparation of these scenarios extending beyond the local planning area (LPA). It includes recent urbanization along Hosur Road, Hoskote, Nelamangala, Bidadi, Anekal and the entire area related to the future airport up to Devanahalli.

Figure III-2: IT Corridor Scenario

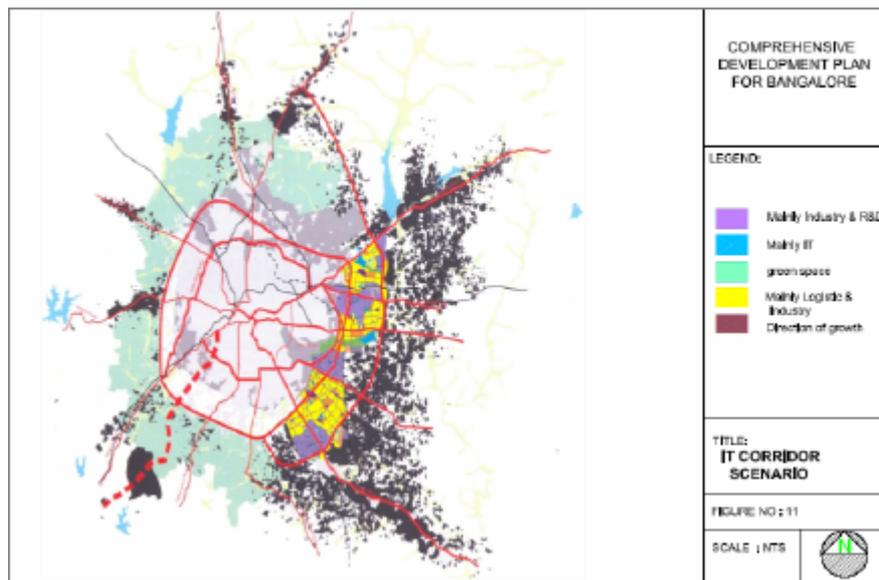
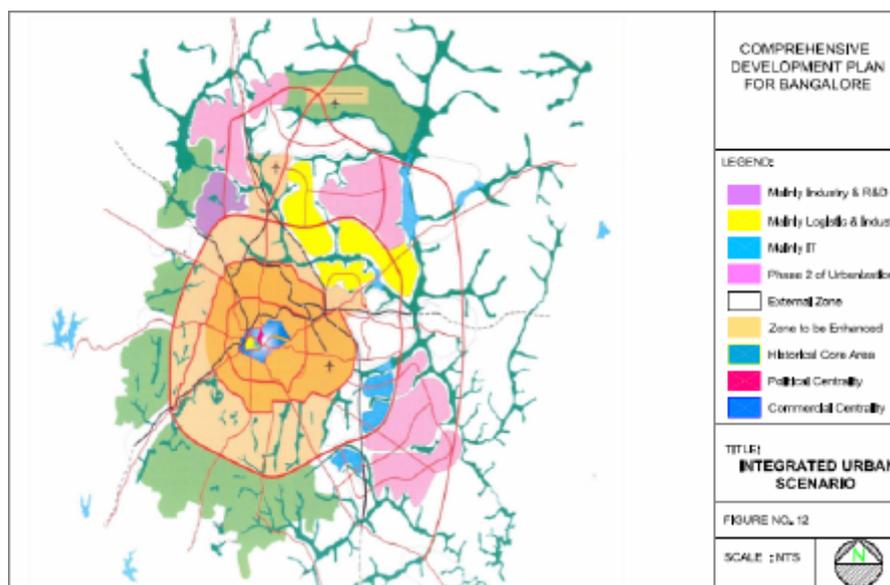


Figure III-3: Integrated Urban Scenario

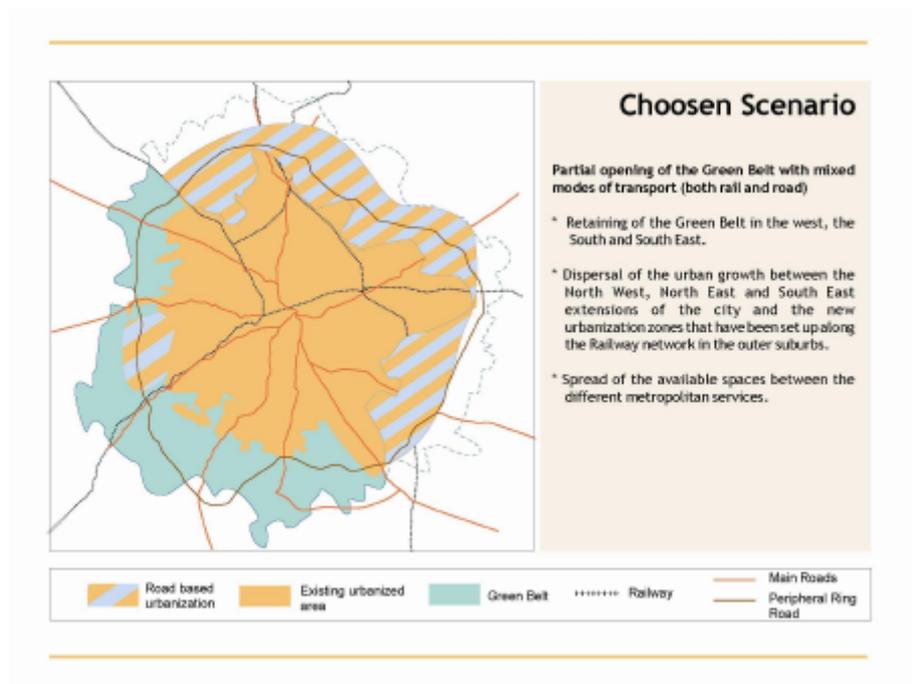


⁵ The Commuter Railway System (CRS), which consists in utilizing the present railway lines for urban transportation should be developed beyond the present urban area to connect the new urbanization areas in the distant periphery.

Adopted Growth Scenario. The partial opening of the Agricultural Zone (Green Belt) with a road transportation system is a realistic scenario suggesting that the Agricultural zone (Green Belt) be retained in the West and South for the following reasons:

- The layouts cropping up in the city's periphery, especially in the South and West, need to be limited to favor and promote urbanization of areas that are earmarked for future development, but remain vacant.
- Most importantly, a look at the hydraulic system prevailing in the city indicates that the best ground water sources are located precisely in the South and West parts of the city. These parts need to be protected from urbanization, which can pollute and destroy these water sources. It is preferable to occupy lands where there are fewer water sources and, if necessary, water can be transported from places with good ground water capacity.

Figure III-4: Adopted Growth Scenario



In conclusion, the partial opening of the Agricultural zone (Green belt) with a road transportation system is a realistic one and is a convenient and less expensive form of urbanization. Under this scenario, continuous urbanization is expected towards the North and the West, two parts of the city already experiencing urban pressure. They can offer areas for development of various types of metropolitan functions.

2. Translation of Growth Scenario into Urban Space

Bangalore's Vision for the year 2015 as developed during the CDP preparation process and adopted by the city's LSGIs is *to retain its per-eminent position as a City of the Future through its cosmopolitan character and global presence, and to enable and empower its citizens with: growth opportunities to promote innovation and economic prosperity; a clean and green environment; high-quality infrastructure for transport and communication; wide-ranging services aimed at improving the quality of life for all; conservation of its heritage and diverse culture; and responsive and efficient governance.*

To address Bangalore's Vision within the adopted growth scenario framework, the following guidelines formed the basis for translating the growth scenario and vision into urban space:

- **City Growth.** Develop a compact city and optimize the economic cost of service delivery, undertake urban renewal of the city-centre and redevelop derelict industrial lands; and develop a sustainable transportation system to connect the city and its socio-economic activity centres.
- **Economic Development.** Foster economic development by encouraging local business, promote a variety of employment opportunities through strategic interventions in enhancing the productive output of traditional industries, and build on existing key events.
- **Environment and Energy.** Preserve the city's natural resources inter-alia comprising the ground water, natural drainage channels and the water bodies, identify, protect and conserve sites of cultural/heritage value, provide and manage a comprehensive, city-wide, public open space network, ensure sustainable use of energy sources and emphasize on use of renewable resources, reduce the negative effects of (air, water and noise) pollution on the environment, and dispose solid and liquid waste in an environmentally and culturally acceptable way.
- **People and Well-being.** Address urban community upgrading to ensure equitable distribution of urban basic services, ensure that programs for the poor and economically disadvantaged sections address basic service requirements, and address basic health and education requirement of the community.
- **Leisure, Art, Culture and Sports.** Preserve the city's and region's art, cultural and heritage values, promote sports and other leisure activities for maximum benefit of the community, and develop affordable and accessible infrastructure to support leisure, art, culture and sports facilities.

C. Legal and Regulatory Framework

Various legislations and regulatory documents govern developmental initiatives in the State. A list of the same is detailed in **Table III-1** below, and has an impact on the Master Plan development and implementation.

Table III-1: Legal and Regulatory Framework Affecting Developmental Initiatives

Framework Category	Acts
Town Planning	<ul style="list-style-type: none"> • <i>The Karnataka Town & Country Planning Act 1961</i> • <i>The Bangalore Development Authority Act, 1976</i> • <i>The Bangalore Metropolitan Region Development Authority Act, 1985</i>
Municipal Laws	<ul style="list-style-type: none"> • <i>The Karnataka Municipal Corporation Act, 1976</i> • <i>The Karnataka Municipal Councils Act, 1964</i>
Laws Related to Land and Accommodation	<ul style="list-style-type: none"> • <i>The Land Acquisition Act, 1894</i> • <i>The Karnataka Land Reforms Act, 1961</i> • <i>The Karnataka Land Revenue Act, 1964</i> • <i>The Urban Land Ceiling & Regulation Act, 1976 - REPEALED vide Urban Land (Ceiling & Regulation Act 1999)</i> • <i>The Karnataka Housing Board Act, 1973</i> • <i>The Karnataka Rent Control Act, 1962 - AMENDED by the Karnataka Rent Act 1999</i> • <i>The Karnataka Slum Areas (Improvement and Clearance) Act, 1973</i> • <i>The Karnataka Apartment Ownership Act, 1972</i> • <i>The Karnataka Public Premises (Eviction of Unauthorized Occupants) Act, 1971</i> • <i>The Karnataka Industrial Areas Development Act, 1966</i>
Pollution Control Laws	<ul style="list-style-type: none"> • <i>The Water (Prevention and Control of Pollution) Act, 1974</i> • <i>The Air (Prevention & Control of Pollution) Act, 1981</i> • <i>The Environment (Protection) Act, 1986</i>
Other Laws	<ul style="list-style-type: none"> • <i>The Indian Registration Act, 1908</i> • <i>The Karnataka Police Act, 1963</i> • <i>The Motor Vehicles Act, 1939</i> • <i>The Cinematography Act, 1952</i> • <i>The National Highways Act, 1988</i> • <i>The Karnataka Stamp Act, 1957</i>

IV. STRATEGIC INTERVENTIONS

A. Economy and City Growth

1. Population Growth

Even with a decrease in the rate of growth, the population of Bangalore will continue to increase during the coming years if the trends of evolutions observed in the last two decades are adopted. Based on the land demand corresponding to the needs of the economical players, the land needs for housing as well as major amenities, and the impact of ongoing as well as future infrastructure projects, the Master Plan estimates that there is a likely saturation of the current space dedicated to urbanization. Based on this assessment, the Master Plan assumes that the rate of growth cannot be sustained at the current rates, but will reduce in the long-term.

The assessments made based on these trends indicate an estimated population of 8.8 million by 2015 and 10 million by 2021, or an increase respectively of 2.6 million (+43%) and 3.8 million (+61%) in relation to 2001. The estimate of this population was based on the rate of growth between censuses evolving from 3.25% in the last census of 2001 to 2.5% in 2015 and 2% in 2021. Between 2001 and 2015, this growth represents an average increase of +191,300 persons each year. The proposed population growth is indicated in **Table IV-1**.

Table IV-1: Proposed Population Growth

Area	1991	2001	2011	2021
<u>Population Growth (lakh)</u>				
BMP	3.302	4.303	5.143	5.559
Non-BMP	0.828	1.867	2.872	4.409
Total Population – BMA	4.130	6.170	8.015	9.968
<u>Annual Growth Rate</u>				
BMP Growth	-	2.68%	1.80%	0.78%
Non-BMP Growth	-	8.47%	4.40%	4.38%
Total Growth – BMA	-	4.10%	2.65%	2.20%

Source: JNNURM CDP.

2. Trade, Commerce and Industry

In 2003, the real estate market was at its peak and data from this year may be used as a reference point in analysing the land requirements for office spaces. In the same year, about 630,000 sq. m of office space was sold, of which 500,000 sq. m was for suburban High Tech firms mainly with outsourcing facilities. The remaining 130,000 sq. m represented business offices for the head quarters of High Tech firms and other related sectors (refer **Table IV-2**).

Table IV-2: Distribution of Business Offices in 2003

Sq/metre	Suburb	CBA	Total
High Tech	40,000	45,000	85,000
Other than High Tech	15,000	30,000	45,000
<i>Total</i>	<i>55,000</i>	<i>75,000</i>	<i>130,000</i>

Source: BDA.

The High-tech firms represent approximately two thirds of the business (offices) market; they are divided into in the ratio of 55% and 45% between the Central Business Area (CBA) and the suburbs, respectively (that include their own campuses). The other companies represent only one third of the area but they are divided in the ratio of two-thirds and one-thirds between the CBA and the suburbs. In total, the CBA captures 58% of the market for offices while the suburbs support 42%. By applying the annual potential growth rates to this basic data, the requirements for office area for the period 2003-2015 are projected and given in **Table IV-3**

Table IV-3: Distribution of Business Offices by 2015

Office Type	Suburb	CBA	Total
<u>Area in sq. m</u>			
- High Tech	671,006	813,293	1484,299
- Non- High Tech	234,093	585,394	819,487
- Total	905,099	1,398,687	2,303,786
<u>Annual Growth</u>			
- High Tech	5%	6%	-
- Non- High Tech	4%	7%	-

Source: BDA.

While the above growth in office space for business is an indication of the city's economic position, it also signifies that the economic activities are well balanced and this is one of the key strengths of the City. In the future, it is anticipated that the resources fuelling the economy will flow from human capital. The new economic paradigm will include: (i) diffusion of technology; (ii) dominant anchor firms; (iii) building up fundamental human capital/skill base; (iv) dominant focus on "speed-to-market"; and (v) moving up the value chain in services. Key sectors, which are envisaged to contribute to the growth of Bangalore, include the following: (i) IT/ITES & Bio-technology; (ii) Education; and (iii) Healthcare.

The **strategic outlook** of the Master Plan in promoting trade, commerce and industry comprises:

- (i) Central Business Area (CBA). Bangalore has a trump card that is the juxtaposition of four types of centralities in and around the city centre.⁶ These centralities constitute the present "core-area", unstructured and congested, calling for some sort of spatial organization. The integrated

⁶ The four centralities comprise the economic and historical centrality of the Petta, the political and administrative centrality of Vidhana Soudha, the commercial centrality of KR Market and Russel Market, and a stretch of business centrality at the eastern end of MG Road.

seamless multi-modal transport system would offer substantial potential for centralizing development wherever the transport hubs exist i.e. Metro / Mono Stations and the integrated transport hubs. The present floor area ratio (FAR) restrictions have limited growth in the Central Business Area. The framework of integrated multi-modal transport system would be seamless and would improve the carrying capacity of existing transport corridors manifold. This could in turn mandate higher FAR in identified Central Business Areas. The existence of Metro Stations could lead to development of more than one CBA. This could be done by allowing high FAR for buildings located in such areas under the control of LPA and requiring the parking spaces in the buildings. Public and semi-public places in the heart of the city will be preserved.

- (ii) Industries and Services. As the services sector seems to one of the important factors influencing urban growth, it needs to be promoted keeping in mind that concentration of such activity should not be encouraged and other sectors also require attention. The existing employment areas along major roads and other clusters such as Peenya, Bommasandra or Electronic City are strengthened and extended. Besides these, the Master Plan has identified several new industrial/ employment areas. These are represented according to their predominant purpose:
- **General Industrial Activities.** Three new locations in the North of the city have been identified in the Master Plan as Industrial Zones. They are directly accessible by major roads and the Peripheral Ring Road; and
 - **High-tech Zone.** A significant area between Whitefield (ITPL) and Electronic City, with potential for urbanization, is proposed as a High-tech zone. It is located between the Bellandur valley, the railroad to Salem, the new Peripheral Ring Road and Hosur Road. This proposal strengthens the existing High-tech area located in the eastern part of the city and also helps accommodate future demands in this domain. A small portion of the western side of conurbation is proposed to accommodate the High tech zone and provide a strong base /activity centre.
- (iii) Secondary Centres. “Sub-Centres” can be defined as areas with compact regrouping of public services (administration, education, health) and private services, primarily trade and crafts. They must be located in areas that are particularly well served by public transportation, near railway stations, or near big road/rail junctions. These sub-centres must have a significant cultural and recreational component. For the city to be capable of catering to about one million people with services of quality there is a need for about ten such sub-centres. They will provide adequate service to the people, de-congest the city centre, and structure the city efficiently.
- (iv) Hawking/Informal Sector. The Master Plan will draw from the National Policy for Urban Street Vendors and focus on the key objectives of legal status for vendors, facilities for vendors and creating hawking zones, introducing regulations for hawking, treating hawkers as an integral and legitimate part of the urban distribution system, promoting self-compliance amongst street vendors, promoting organizations of street vendors to

facilitate their empowerment, establishing participatory mechanisms for orderly conduct of urban vending activities, introducing measures for promoting a better future for child vendors, and promoting social security and access to credit for street vendors.

Significant actions arising from the strategic outlook to the sector will be driven by industry forces while the Master Plan itself will provide land use regulations to facilitate provision of space and developmental regulations for trade, commerce and industry.

3. Urban Integration – Extension, Renewal and Redevelopment

Translation of the growth scenario into the urban space requires control of urban sprawl and encouraging filling up of vacant areas, sensitizing new development to the natural framework, linking land values to the market economy rules, facilitating mixed use and densification, enhancing the value of the Petta, organizing the core and promoting a Central Business Area (CBA), favoring urban renewal of places around the centre and major roads undergoing change, and promoting urban renewal of the central derelict industrial sites.

The **strategic outlook** of the Master Plan in relation to urban integration comprises:

- (i) **Extension.** Firstly, vacant lands in the strategic areas need to be occupied and the spread of layouts need to be minimized – based on the concept of developing a “compact city”. Secondly, it is essential to respect the valleys and maintain the natural drainage system. This implies that new development must be allowed for integration of natural components within schemes and programs. It is also essential to protect ground water sources and regulate tapping of the ground water. Lastly, land values should be linked to the market economy rules: the built area density should be proportional to the land price and the presence of transport infrastructures.
- (ii) **Renewal.** The peri-central area (around the city’s core) consists of spaces of great value and potential for development, especially in terms of reconstruction of older parts. The older neighborhoods consisting of villas and bungalows (Basavangudi, Visveswarapuram, Chamaraajpet, Malleshwaram, Gandhinagar, etc.) that were at the city’s periphery a century ago find themselves close to the central area today. These neighborhoods with well planned infrastructure must evolve by offering more floor area ratio (FAR) than is permitted today specially with respect to housing. Besides the older neighborhoods, many major roads that once supported trade and industries are also undergoing change today; Hosur Road is a good example. It is necessary to promote a wider range of activities, particularly along the street facades, while setting back the industrial uses from the street. Apart from the textiles and garment sector, many traditional industries (metallurgy, and electronic products, among others) occupy vast areas and are available for redevelopment. The lands occupy pivotal positions, at the intersections of important roads, between the city centre and the periphery (in the peri-urban centre). This area is viewed as the extension of the city’s core area (Petta) and central business area and deserves

attention.

- (iii) Redevelopment. The derelict industrial lands of Binnypet-Cottonpet have major potential as redevelopment opportunities. Their redevelopment calls for the conception of a specific program dedicated to “centrality of traditional activities” with regards to the following: (i) promotion of activities (markets), and creation of mini-zones of activity; (ii) creation of public infrastructure and amenities; and (iii) experimentation with social housing (to create a salubrious equivalent of the vattaras). The Master Plan recommends that the redevelopment programs must be developed according to a specific blueprint, on a contractual basis.
- (iv) Land Use. A look at the City’s density shows considerable contrasts with areas overcrowded and vast areas of low density having scope for densification. Areas with 600 persons/ha, at the neighborhood scale, with ground-level housing, is an indicator of a highly populated area, while many other areas have densities lower than 200 persons /ha. This densification has many objectives: the denser a city, the lesser is the encroachment on natural and agricultural resources. It also promotes less utilization of cars/private modes of transport. However, it is important to encourage mixed use urban fabrics, in particular in the central or core area of the city. There are two types of mixed uses, live-work mixed use and a mix of different activities. The first has the advantage of reducing work related trips and creating more convenient conditions; the second helps better economic efficiency and urban quality while associating complementary economic functions such as trade, crafts and small industries.

Mixed Use. The Master Plan advocates mixed use of land in specific areas and the land use zonal regulations (**Volume 3**) provide details on the identified areas. While mixed use provides for non-residential activity in residential premises, it aims to balance the socio-economic need for such activity and the environmental impact of the said activity in residential areas. Mixed use allows access to commercial activities in the proximity of the residences and reduces the need for commuting across zones in the city. The mixed use policy under the Master Plan therefore follows a differentiated approach based on the character of the identified regions – subject to the socio-economic status of neighborhoods and their preference to have commercial activities within the neighborhood. At the same time, mixed use needs to be regulated in order to manage and mitigate the associated adverse impact related to congestion, increased traffic and increased pressure on civic amenities. In promoting mixed use of land in designated parts of the city, the Master Plan makes adequate provision for meeting community needs, mitigating environmental impacts and providing for safe and convenient circulation and parking.

Significant actions arising from the strategic outlook to the sector comprise:

- Diversion of traffic in these areas by introduction of “one-ways”;
- Enforcement of new parking regulations;
- Ban on entry of heavy goods vehicles in such areas;
- Widening of roads;

- Removal of encroachments;
- Appropriate transport system for the commuters to reduce own vehicle usage;
- Development of pedestrian walkways and cycling zones;
- Demarcation into transport and utility zones;
- Maintenance of open spaces; and
- Improvement of civic services.

4. *Housing and Shelter*

The Census 2001 data indicates that 92% of the households live in permanent houses, a situation that is better than that of urban Karnataka (at 77%). The statistic of joint family households is barely higher than 1 and has been decreasing since 1971. The percentage of population living in slums is lower in comparison with the population living in slums in other large cities, particularly Chennai, Ahmedabad or Hyderabad. About 95% of the households have electrical connections, an increase by 10% when compared with the data of 1991 (83%). Despite these favorable elements, the current situation is a cause for concern. Key issues are as follows:

- The persistence of small houses and overcrowding in households: The data of 2001 indicates that more than one third (37%) of the households continue to have only one room housing. About 64.5% of the lower income group and 53% of the middle income group are occupied by the two room houses and only the higher income group experiences a more favorable situation with an average of 3.5 rooms per house.
- The stagnation of occupancy status: In 1991 there were about 50% houses that were occupied by tenants against 46% household owners.
- The persistence of tenants in small houses (one room): Among households with only one room accommodation, the tenants are more in number with 57% against 38% of household owners.
- Insufficient level of amenities in housing: Only 53% of the households have a water tap in their house.

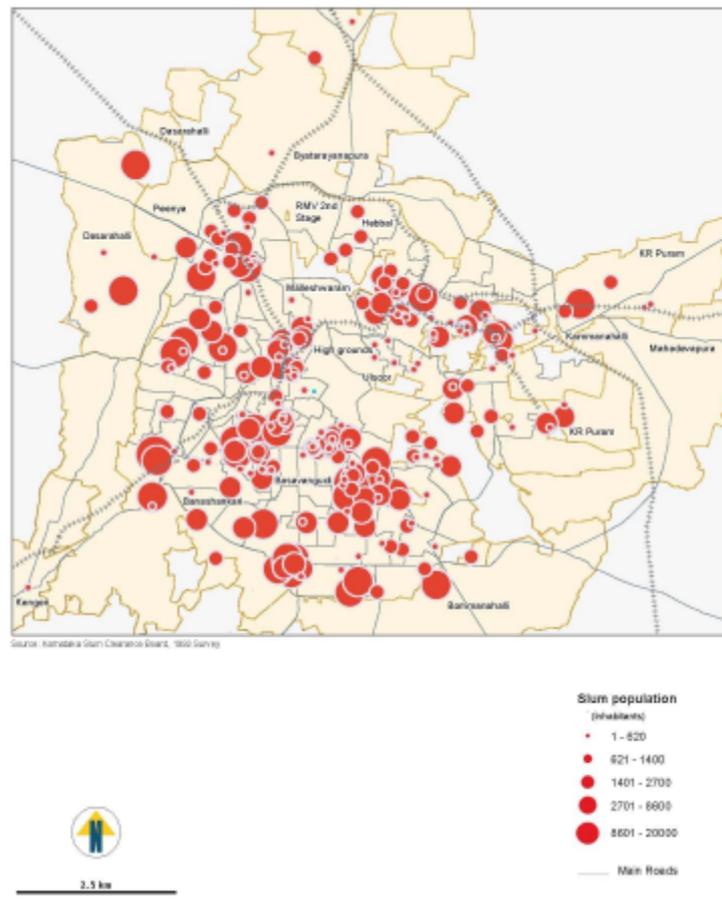
These issues reflect the housing concerns in the city and highlight the challenge to improve the conditions through planning intervention in light of the high rate of the city's economy and its status as an attractive employment destination.

Between 1990 and 2003, there has been an increase in the total residential area (built and occupied) and it amounts to 44 sq. km. The 2.89% annual growth rate of the residential area (built and occupied), does not match the annual population growth rate of 3.28% during the same period. In addition, the numbers of households are increasing, which implies that the demand for housing has also increased. The deficit is therefore compensated by smaller sized housing and most probably by a densification of space already urbanized. This data also reveals that there seems to be a rising disparity between the different economic classes leading to the expression of housing concerns for the economically weaker sections. The absence of affordable alternatives, that results in informal and under equipped type of housing.

In 1991, the city’s housing stock comprised of 43.1% public housing, 23.5% Informal housing in form of sites/plots, 17.7% slums and 7.3% traditional housing. The remaining 8.4% consisted of housing in the villages, cooperative housing and housing built by private builders.

In 2001, the Bangalore City Report survey helped to highlight the important changes in the structure of housing production. While public housing (CITB, BDA, KHB, and BMP) represented 43.1% in 1991, it was almost reduced to half in 2001 (22.8%). However, the informal housing in form of plots/sites in 2001 totaled 55.9% while it barely represented one quarter of the housing in 1991. At the same time, the production by the private builder increased from 0.8% to 5.2%. Although the results of this survey need to be interpreted with caution, they point to important changes in the process of housing production. They illustrate the difficulties encountered during the last decade by public bodies /departments to contribute to the housing supply. During this decade, a large part of the demand for housing was supplied by villages in and around the city and by different forms of informal housing.

Figure IV-1: Location of Poor Settlements



After 2000, the considerable growth in the BDA housing production changed the trend. Between 1999 and 2002, the total number of plots produced by the BDA was 39,850 for a developed area of about 2,000 hectares. In 2001 and 2002, its production reached 15,000 plots/year, in other words, there was a ten-fold increase in comparison with the average of the 1990s. Housing supply in the formal sector (legal public and private housing) did not meet more than 50% of the requirements of the annual population growth of the city.

Box 2: Slum-level Statistics

According to the KSCB data (Karnataka Slum Clearance Board), 367 slums have been listed in BMP area in 1993 of which 203 slums are declared and 164 slums are undeclared. To these 367 slums, 106 slums exist in the seven CMCs, making a total of 473 slums. The total population in the slums as per a 1993 survey is 791,000 with 142,218 households.

According to a 1999 survey conducted in the context of a slum upgradation program, Bangalore city had 468 slums and an additional 20% was considered. A 10% growth rate was assumed for the next two years, indicating an estimate of 680 slums in the year 2001.

In line with the **National Housing and Habitat Policy**, which has the ultimate goal to ensure 'Shelter for All' by harnessing the potential of the public, private/corporate and household sectors, the "shelter" provision in the Master Plan aims to ensure effective housing and shelter options for all citizens, especially for the vulnerable groups and the poor, by creation of adequate housing stock. This would be attempted both by encouraging rental and ownership housing. In keeping with the developments in public administration, the role of the public agencies such as KHB / KSCB / BDA / BBMP would be as facilitators through policy and strategic interventions. This Master Plan recognizes the strong spatial relationship with employment, social services and urban activities that the housing sector displays.

The role of the Government would have to be both as a provider and facilitator to expedite the process of providing affordable housing. Much of the housing need can be satisfied through redevelopment/upgradation of existing built-up areas through:

- Shifting from plotted housing to group housing for optimal utilization of land;
- Encouraging private sector participation for development/redevelopment; and
- Encouraging optimum utilization of land and facilitating viable projects by removing unnecessary controls on height, set-back, etc.

The **strategic outlook** of the Master Plan in relation to Housing and Shelter comprises:

- (i) **Housing Strategy.** The Housing Strategy incorporates specific approaches for development of new housing areas, upgradation and intensification through redevelopment of existing housing areas including unauthorized colonies, slums, squatter settlements, etc. In public housing the important aspect of affordability should be kept in view and the construction typologies should be varied accordingly. This means one-two room tenements can be provided only in Ground +3 or +4 storied walk-up structures, without lift, while the higher categories of housing can be

provided in high rise construction. A fixed FAR could, lead to under utilization of FAR or imposition of artificial limits for the optimal use of land, which is in scarce. Specific housing plans can be evolved with reference to the following: (i) determination of area requirement; (ii) identification of the areas for urbanization / housing development; (iii) evolving the pattern and norms for new housing development; and (iv) the mode and manner of development and the roles of the private and public sectors in the process.

- (ii) **Budget Housing.** The category of the urban poor are mainly those who are employed but are unable to afford housing from the formal sector and are forced to become part of the informal squatter settlements. Many of these people form part of the service sector which including domestic helpers, hawkers and vendors, low paid workers in the industrial, commercial, trade/business sectors, etc. In addition, there are the migrants who also need to be provided housing. A mix of approaches and innovative solutions are required to meet the housing requirement,⁷ which would, inter-alia, include,
- Resettlement, whether in the form of in-situ up-gradation or relocation, should be based mainly on built up accommodation of around 30 sq. m with common areas and facilities, and horizontal plotted development would not be taken up.
 - The concept of land as a resource would be adopted to develop such accommodation with private sector participation and investment to the extent possible.
 - Incentives by way of higher FAR, part commercial use of the land and, if necessary and feasible, TDR should be provided.
 - A cooperative resettlement model may also be adopted with tenure rights being provided through the institution of Cooperative Societies, wherever such institutions are existing and functioning well.
 - The provision of accommodation should be based on cost, with suitable arrangements for funding/financing keeping in view the aspect of affordability and capacity to pay including support from State and Central Govt. programs involving both Government and non Government agencies.
 - In cases of relocation, the sites should be identified with a view to developing relatively small clusters in a manner that they can be integrated with the overall planned development of the area, particularly keeping in view the availability of employment avenues in the vicinity.
 - Suitable arrangement for temporary transit accommodation for families to be rehabilitated is to be made. This may preferably be near or at the same site and the utilization of these may be synchronized with the

⁷ New housing units should preferably be in the form of two room units with an area of 30 sq. m to 50 sq. m, which would be developed through public and private agencies, and agencies of Government such as KHB/KSCB/BDA/BBMP. As housing for EWS constitutes the bulk of housing stock that has to be provided, there is need for adequate land and cross subsidization to make it affordable. The funds under various Government programs such as JNNURM and IHSDP shall be utilized to meet the viability gap, if any. The pattern of EWS housing shall be such as to ensure optimal utilization of land in a sustainable manner with multi-storied housing as the preferred option. Apart from mandatory provision for EWS housing in all group housing projects/scheme, the primary responsibility for creating adequate stock of housing for urban poor shall be borne by public agencies.

phases of implementation of the scheme of in-situ up gradation.

- Community Based Organizations (CBOs) and Non-Governmental Organizations (NGOs) should be closely involved in the resettlement process.
- It would be mandatory for developers to ensure that a minimum of 15% of FAR or 35% of dwelling units, whichever is higher, are earmarked for EWS and lower income category.

(iii) Redevelopment of Slums. With 17.7% of the housing stock of Bangalore in slums (1991 figures), the situation has only gotten worse with the rapid growth of the city. The settlements are characterized by over-crowding, unhealthy and in-sanitary conditions, and lacking in basic amenities. The slums constitute an environmental hazard in themselves and also to the areas around them. These settlements are intricately linked economically and otherwise to the surrounding localities and consequently the preferred development would be in-situ. Relocation would be resorted to only in those cases where conditions pose a danger to health and cannot be improved, or where the lands are required for a public purpose. The first step would be to ensure that the existing slum areas are residential whatever be the current land-use allocation. In addition, to take up the redevelopment and improvement schemes of slums certain relaxations are required in the zonal regulations to make the projects viable from a private-public-partnership angle. This will have a critical influence on whether Bangalore will be able to obliterate its slums and put in place an effective program of housing for the poor. The details of relaxation sought are indicated in **Volume 3: Land Use Zonal Regulations.**

(iv) Night Shelters. The provision of Night Shelters is envisaged to cater to the shelter-less pavement dwellers and can be provided near Railway Terminals, Bus Terminals, Wholesale/Retail markets, Freight Complexes, Hospitals etc. The locations could be identified keeping in view major work centres and special provisions should be made for the homeless, women and children including the disabled, orphans and elderly. In addition, multi purpose use of existing facility buildings may be allowed for night shelter purpose and provisions should also be made for converting existing buildings⁸, wherever available, into night shelters.

(v) Rental Housing. In towns and cities wherever Government land is available, accommodation may be provided to the government employees and also to the employees working in private/industrial/service sector. This would increase the housing stock and regulate the real estate market. The Rental Housing Scheme may be taken up through Karnataka Housing Board and Rajiv Gandhi Rural Housing Corporation Ltd. The BDA/BBMP may

⁸ In the first phase night shelters could be constructed in the premises of government hospital where they could also be used by the attenders of mofussil patients. In order to make the provision of this facility financially sustainable for the local body innovative concepts such as integrated complex with incentive package should be designed by the concerned local agency in collaboration with the Govt. with a view to develop self sustaining night shelters. Any fund from Govt. agencies can be utilized to support the scheme and support from NGOs should also be considered not only to build but also to run these night shelters.

provide suitable lands for Rental Housing Scheme and also encourage public private partnership in developing Rental Housing. The scheme shall comprise of high rise buildings and minimum of Ground+3 type. The funds borrowed from Financial Institutions, if any, shall be guaranteed by the Government. The rent payable shall be determined based on type of house/flat offered by the occupant.

5. Transportation

The road network in Bangalore has a star-like structure where all the major roads converge on the centre of the city. In the absence of transverse roads and links along with the non optimized public transport contributes to traffic congestion in the city's core area. It has led to increase in accidents and especially loss of time, which hinders the functioning of the economy. The road system in the city has two drawbacks. During the last six years, this system has developed by only 11%, which is relatively small when compared with the extent of spatial expansion of the city. Several major efforts including building new flyovers and the Outer Ring Road have been implemented to reduce the thoroughfare traffic inside the city and facilitate the links within the peripheral areas. However, the existing radial and convergent road structure is a very restrictive and the absence of a bypass system around the city's core area is felt.

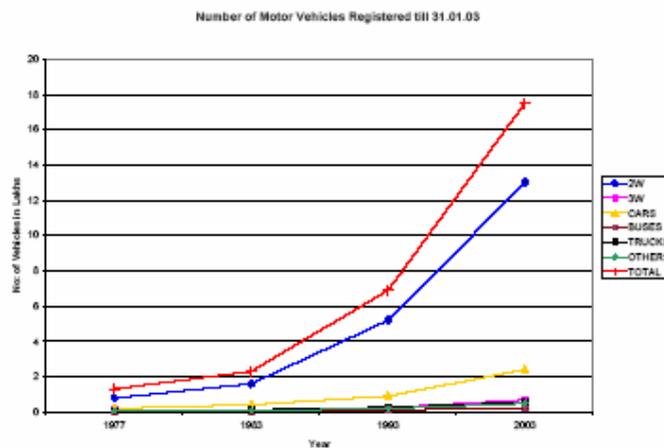
BMP has about 3,500 km of road (including 250 km of arterial roads and 100 km of NH and SH), 38,000 intersections, 41,000 small roads, 162 signalized intersections, and 600 manual intersections. The ULBs (around Bangalore and now a part of the BBMP) have around 2,400 km of road network. While the standards of "length" are more or less in order, the problem relates more to the fact that the width of roads is inadequate. Any transport intervention would therefore need to consider this constraint. For instance, this could imply that bus service would be self-limiting and reach saturation at some stage, and that higher quality wide-bodied buses would be difficult to run. Consequently, the importance of having other rail-based systems that use a different or elevated right-of-way, such as a Metro or Light Rail Transit (LRT) system, is therefore established.

Table IV-4: Vehicular Growth

Vehicle Type	Units
Two Wheeler	1,896,907
Light Motor Vehicle	405,622
Auto-rickshaw	81,502
HTV	24,126
HGV	97,801
Others	11,407
Total	2,517,365

Source: JNNURM CDP.

The number of registered vehicles in Bangalore has increased rapidly from 400,000 (1987) to 2.3 million (2005) – refer **Figure IV-2**. The CAGR was over 10%, and the growth rate of 2-wheelers, in particular, was around 17%. The average number of vehicles per household has increased six-fold in the last 25 years i.e. approximately 0.3 (1980) to 1.7 (2005).

Figure IV-2: Vehicular Growth in Bangalore

(Source: Traffic survey Data. 2002. RITES Ltd. 2002)

Private vehicular transport constitutes a very sizeable proportion. Of the 2.14 million registered vehicles, 1.58 million vehicles account for 2-Wheelers, and 300,000 vehicles are cars – 88% of total vehicles are personal vehicles. 2-wheelers, which constitute about 72% of total vehicles, are growing at about 17% per annum. Considering that 2-wheelers occupy between 0.4 to 0.7 PCU, this is a critical issue needing to be addressed.

Table IV-5: Modal Split for Travel Trips

Vehicle Type	% Walk Trips	% Without Walk Trips
Car	4.56	5.44
Two Wheeler	30.40	36.31
Auto-rickshaw	5.77	6.90
Bus	40.96	48.91
Walk	16.26	-
Cycle	1.68	2.00
Other	0.37	0.44
Total	100.00	100.00

Source: JNNURM CDP.

The National Transport Planning Commission indicates that in the provision of transport facilities for the urban population normally the modal split in major cities is still in favor of public transport. But this is being eroded gradually due to the unprecedented growth of motorized two wheelers. The NTPC indicates that the PT (Public Transport) modes conventional bus would continue to be the dominant mode due to resource constraint and rail mode would be beyond reach of most cities. But larger cities specially ones with 3 million plus population will have to initiate action for introduction of some form of mass transit. This is necessary for three reasons viz., (a) in such cities very little additional capacity can be squeezed out of conventional bus; (b) preparation of plans for urban areas is a long drawn affair and advance planning action taken can help identify cost effective solutions to deal with problems before it is too late; and (c) variety of technical choice are available such as ETB, LRT, RRT, Commuter rail. A suitable economical choice has to

be made within budget constraint without looking for outside sources.

Box 3: Traffic and Transportation

The traffic situation in Bangalore is one of its key problem areas. Between 1991 and 2005, the number of vehicles registered in Bangalore has gone up from 0.68 million to 2.2 million, which constitutes an overall increase of more than 200%. In the same period, while the population growth rate was 3.25% per year, the growth rate of motor vehicles has increased by 10.8% i.e. three times higher. Today, Bangalore has the highest vehicle growth rate among cities that have over 1 million people. It takes second place (Delhi being the first) for total number of motor vehicles. Bangalore shares with Delhi the 1st place for having the most number of vehicles per person (32 vehicles per 100 people).

There is a considerable rise in the number of two wheelers, which constitute about 74% of registered total motor vehicles. The steep increase in this transportation mode can be attributed to the increase in income levels or revenue, the preference of the 20-30 year age group for this mode of transportation, and the absence of an adequate public transport system. Simultaneously, the growth in the number of cars has been more than 10% per year in the last 10 years.

Traffic problems in Bangalore occur primarily due to the structure and the configuration of the road network, which converges on the city's core area and causes congestion, and the absence of transverse links between the radial roads. In addition, the extensive development of urbanization and separation of functions forces a dependence on private means of transport.

An analysis of statistics on use of various modes of transport in Bangalore indicates:

- More than 41% of the city's population uses the bus as a means of transportation. Currently, BMTC transports 3.15 million passengers per day, representing 55,000 trips per day with 3800 schedules.
- A little less than one-third of the population uses two wheelers (30.4%) and 5% use cars. The rest of the population shares only other means of transport namely, pedestrian (16%) and bicycles (1.7%).
- The importance of public transportation (bus and auto rickshaws): It provides transport for 5 out of 10 households.
- The growing percentage of individual transport (3 households for 10): Although use of private vehicles or individually owned cars represents only 5% of trips, the number is increasing at an impressive rate.
- The percentages of people who walk and cycle: This constitutes 1 household out of 5.
- The imbalance between transportation mode and trips: In terms of trips, pertaining to Public and Private motorized transportation about 41% and 35% while Public transportation (41%) dominates private motorized transportation (35%) in terms of trips, the latter represents 87% of traffic (number of vehicles) against 2% for public transportation.

This situation gives an idea of the difficulties the city will face in the near future in the absence of adequate management of transport and traffic. A hundred percent increase in motor vehicles in the next seven to ten years can be expected.

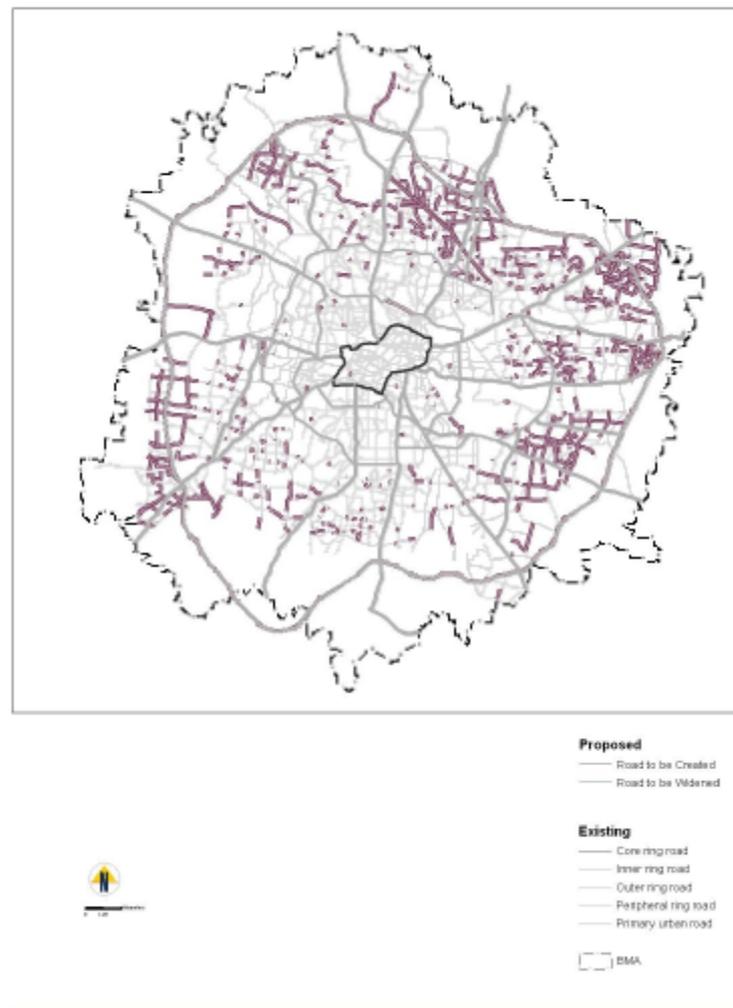
Based on the governing concept and directive principles for the Master Plan and in line with the **National Urban Transport Policy**⁹, the **strategic outlook** to develop a networked city through a sustainable transportation system comprises:

- (i) Development of a Structured Road Network. The street network for future urbanization should be public knowledge and fixed on the ground. The street

⁹ The salient recommendations of the NUTP include integrating land use and transport planning, equitable allocation of road space, priority towards public transport, priority to non-motorized transport, mandatory multi-level parking in metropolitan cities, and increased involvement of private sector participation.

network and urban development supported by it must be integrated within the watershed framework of the city. The road network system of Bangalore has major deficiencies, both in terms of conditions of roads and the structure of the network. The basic structure is radio-concentric with about ten major roads converging on the centre; the roads themselves are crowded and their convergence creates heavy congestion. In this regard the top most priority is to create a Core Ring Road around the city's inner core area to supplement the Outer Ring Road. In addition, an Intermediate Ring Road must be provided as a loop with separate lanes for buses.

Figure IV-3: Proposed Road Network

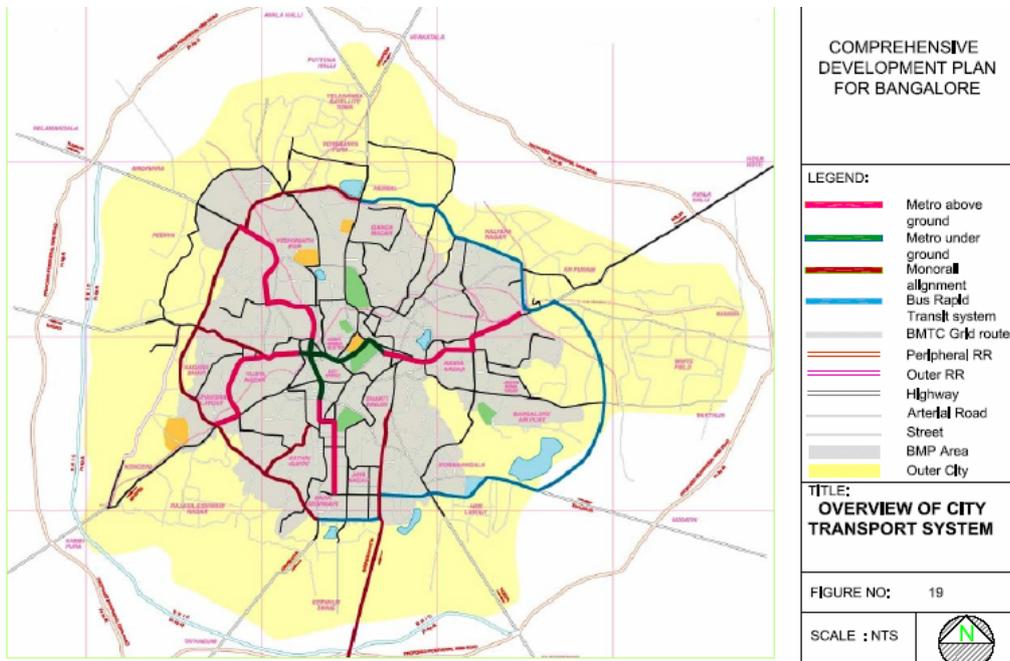


- (ii) Organizing Transportation/Logistics Facilities. The function of transportation (logistics) is a necessary component of a metropolitan city. These areas not only act as storage facilities, garages, heavy vehicles, but also provide for personnel, technicians and offices. It is a function that demands a lot of space and should be strategically located. It requires areas that are located at major junctions and at connections between different modes of transportation and should be well networked through road, rail and air. In Bangalore, the main transportation (logistics) area is situated in the North-East quadrant of the city between Whitefield Road and Doddaballapur

Road. In the East, the main logistics area is the CONCOR terminal along the Chennai railway line, which is the main entry to the town. In the North, the logistics area is located where the Doddaballapur Road, Bellary Road and the two railway lines converge at Yelahanka. Hence, there is a need to focus on facilities along Tumkur, Mysore and Hosur roads to provide for equitable distribution of the said facilities.

- (iii) Developing a Multi-modal Public Transportation System. The present public transportation system is inadequate to meet the future needs of the city. In view of Bangalore’s specific context and existing situation it is imperative that a multi-modal public transport system that offers facilities for collective travel against individual modes of transportation is considered. The multi-modal transport operating systems consisting of road and rail systems, Bus Rapid Transit (BRT), Metro Rail, Mono Rail, Circular Rail and other proven mass rapid transport systems, must respond to all travel needs of households of the City. The multi-modal transport system also would be integrated in such a way that there would be seamless travel across the city. The opportunities to structure urban development offered by such a multi-modal transportation system must be built upon and this particularly includes optimizing the land use pattern along the proposed transportation networks and transport hubs.

Figure IV-4: Proposed Multi-modal Transport Systems



Significant actions arising from the sector strategic outlook comprises:

- (i) Elevated Core Ring Road. It is proposed to develop an Elevated Core Ring Road along the key axial roads with the objective of decongesting the core area. The proposed length of the Elevated Core Ring Road is 29.5 km. The project is expected to commence in 2007.
- (ii) Outer Ring Road. At a radius of 7 to 10 km from the city centre, the Outer Ring Road covers a total length of 62 km. The project was completed in 8 months at a total cost of Rs.1820 million. The ORR connects all major roads and highways in and around Bangalore.
- (iii) Intermediate Ring Road. BMRDA is planning this ring to connect Nelamangala, Bidadi, Harohalli, Tattakere, Hosakote, Aradeshahalli, and Mylenahalli, to divert traffic and reduce the vehicle movement within the city centre. At a total length of 188 km, the eight-lane IRR is estimated to cost Rs.7500 million.
- (iv) Proposed Peripheral Ring Road. It is proposed to construct a Peripheral Ring road for a length of 117 km around Bangalore, at a radial distance of 2.80 to 11.50 km from the existing ORR. The PRR would be a 6 lane bi-directional divided carriageway. The project is expected to be developed in two phases occurring during 2007-12 and 2013-17. The estimated cost of the PRR is Rs.11,700 million. The BMTC has proposed to construct bus terminals and bus shelters along the PRR.
- (v) Satellite Township Ring Road. Beyond the IRR, BMRDA is planning a set of satellite townships, which would be connected by the STRR. Surveys for the IRR and STRR are in progress.
- (vi) Improvements to Key Roads. Other than the ring roads, axial roads are proposed to be improved. It is proposed to undertake improvement of existing arterial, sub-arterial and other link roads.
- (vii) Grade Separators. Railway Over Bridge (ROB) and Railway Under Bridge (RUB) are proposed to be constructed at key locations in the city. The projects are proposed to improve the free flow of traffic.
- (viii) Airport Link Road (Express Way). The Express way envisages a dedicated high speed airport access between the city and the new International Airport at Devanahalli. The Airport Link road is proposed to be constructed during the period 2007-12 at an estimated cost of Rs.6000 million, spread over a stretch covering 78 Ha.
- (ix) Bangalore Metro Rail. The Bangalore Metro Rail is proposed as a mass rapid transport system to decongest the traffic in the city roads. The metro system configured on two busy corridors of the city – the East-West and

North-South corridors ¹⁰ – is based on similar lines as the Delhi Metro Railway. The estimated cost of Bangalore Metro Rail is Rs. 56,050 million with debt financing from the Japan Bank for International Cooperation (JBIC).

- (x) Development of Commuter Railway System. The CRS project comprises integration of the commuter railway project providing connectivity on existing surface railway lines in Bangalore with the proposed Metro Rail Project. The project envisages providing a mass urban transportation system along the existing railway lines covering 62 km on the North-South and East-West axis of the city.¹¹ The project is to be developed in two phases spanning over the implementation periods of 2007-2012 and 2013-2017. The estimated cost of the project is Rs. 6500 million with Rs. 3250 million incurred in each block. The land requirement for the project is approximately 62 Ha.
- (xi) Bus-based Transport Systems. High Capacity buses are proposed along the ORR on a dedicated corridor in contiguous stretches where the requisite width is available. The buses will operate on a new technology designated for urban environment. The project involves infrastructure such as bus lanes, road improvement, upgrading bus terminals, traffic signals and bus stops. The estimated cost of the first phase of the High Capacity Bus System is Rs. 400 million. The expenditure involves 25 articulated buses, specially designated for city routes with seating capacity up to 250 per bus and additional room for standing passengers.
- (xii) Parking. The Master Plan will advocate provision of park and ride facilities at bus depots along the periphery and induce the motorists to park there and travel to the center of the city by public transportation. Restrictions shall apply on On-Street Parking at select locations. Mini Parking lots/At-grade parking will be established on vacant lands owned by various government agencies/BBMP, etc.
- (xiii) B-TRAC. Bangalore City Police have envisaged the Bangalore Traffic Improvement Program (B-TRAC 2010), with an estimated cost of about Rs. 3500 million, and for the financial year 2006-07, the Government has set apart Rs. 440 million for the program.

The total cost of significant actions and maintenance of systems over the Master Plan/JNNURM period is approximately Rs. 75.36 billion.

¹⁰ The East-West corridor is to start at Byappanahalli and end at Mysore Road and Ring Road junction and traverses a total length of 18.1 km. The North-South corridor is to start from Yeshwantapur in the North and extend up to JP Nagar in the South and traverses a total length of 14.90 km. The two lines would cross each other at Majestic close to the Railway Station.

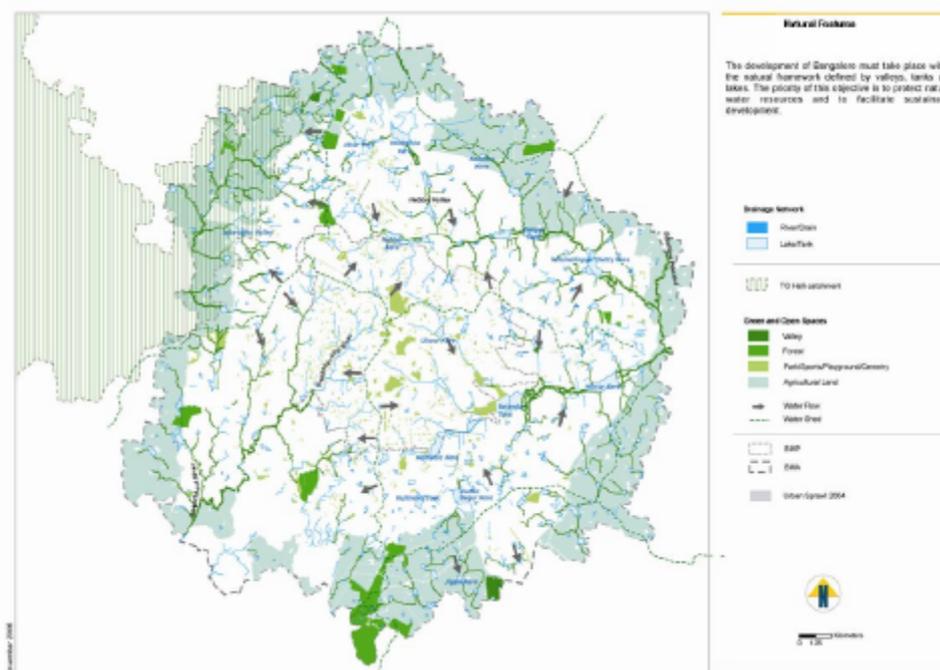
¹¹ The CRS would extend from Kengeri to Bangalore City Railway Station, from Yeswantpur to Whitefield via cantonment, and Yeswantpur to Byappanahalli via Hebbal.

B. Environment and Energy

1. Natural Environment

The urban environment is characterized by the extent of open spaces available in the city and the conservation of natural resources of the city – like lakes and natural drainage channels. Situated on the Deccan Plateau, Bangalore unfolds on a semi-arid plateau constituted of interfluvial valleys whose altitude varies between 760 and 940 meters. The Arkavati River, the only perennial river of the region along the North-West side joins in the South with the Cauvery River and Dakshina Pinakini that runs alongside the Eastern side of the town. In the South-West, the Vrishabavathi River that starts at Basavangudi and Nagarbhavi River are tributaries of the Arkavati River. The valley of Hebbal in the North and that of Bellandur in the South-East, are both linked to Dakshina Pinakini. These valleys connect several lakes and tanks (Hebbal, Varthur, Bellandur, etc.) to form an elaborate hydraulic system that has historically shaped and lent a pattern to the landscape of the city and its surroundings. The lakes and tanks serve as water storage systems for agricultural purposes and also help in the replenishment of ground water resources. Often they constitute ecosystems of great wealth.

Figure IV-5: Bangalore's Natural Framework



In order to preserve the city's natural environment, around 25 lakes have been developed in the city through initiatives undertaken by the BDA, the BBMP and the Lake Development Authority. Perceiving the imperative need to conserve the lakes in and around Bangalore, GoK constituted the "Lake Development Authority" in 2002 and the LDA so far has developed five lakes in Bangalore using funding from the National Lake Conservation Program. The BDA has developed three lakes including the Lalbagh Lake.

The Forest Department has also taken initiatives for development of 17 lakes, planned for maintenance of 11 lakes, and developed a Master Plan for five lakes in the city. The BBMP has developed four lakes adding to the overall initiative of the city government's vision to preserve Bangalore's environment. Parks have also contributed to conserving the urban environment and arrest air pollution through green spaces. Important parks¹² in Bangalore are:

- Lalbagh Botanical Garden (area - 97 acres, 1854 species, 673 gene and 890 cultivars of plants);
- Cubbon Park (68 genera, 96 species, total of 6000 plants/trees);
- Bannerghatta National Park, located 25 km from the city houses important flora and fauna;
- Dhanvantarivana at Jnana Bharathi, spread over 37 acres is a garden of medical plants and consists of 414 species; and
- Parks maintained by Department of Horticulture - 365 (well developed - 55, partially maintained - 130, undeveloped - 180).

Regulations and initiatives for open spaces and green areas comprise:

- Land earmarked for park and open spaces in CDP, 1995: 77.9 sq. km (14%);
- Requirement under BDA – not less than 15% of the area for parks and open spaces in any newly formed layout;
- 22 theme parks and 16 tree parks under "Greener Bangalore" being implemented by BMP and BDA;
- The Forest Department has raised plantations of around 130 sq. km by planting around 35 lakh plants; and
- BMP has developed 48% of the 560 parks in the City.

Bangalore has been a witness to the decline in the number of lakes and inadequate maintenance of parks, which are the symbols of Bangalore. Recognizing the need to revive the same, the **strategic outlook** of the Master Plan is to ensure that Bangalore retains its position as a "Green City" by creating urban spaces and adopting a systematic approach to the creation and maintenance of lakes, parks and green spaces.

Significant actions¹³ proposed during the Master Plan period include:

- (i) Redevelopment of Lakes and Urban Afforestation. The projects proposed include development of recreational spots, fencing, desilting of lakes, diversion of sewage, prevention of garbage dumping in the lakes and initiation of activities such as gardening. The remodeling of drains by the BBMP and the Master Plan specification on buffers along drains (in

¹² The budget for development of park and gardens is about Rs.590 million for 2005-06, out of which Rs.60 million is earmarked for maintenance.

¹³ While projects shall be facilitated by the respective agencies, as far as possible, the projects shall be structured on a PPP basis. In some cases, sponsorship by private agencies, such as "Adopt a Lake/Park" scheme will also be adopted.

consultation with the Karnataka State Pollution Control Board) provides for clear and uninterrupted drainage of storm water.

- (ii) Development of Existing and New Parks. Parks, playgrounds, urban forestry, etc., cover an area of approximately 14% of the total area of the city vis-à-vis the norm of 20%. The cost of development has been assumed at approximately Rs. 10 million in the BBMP area. BDA also proposes to develop parks at Sulikere Forest (Kengeri Hobli), Magadi Roads (Kanhalli and Kodigahalli), and Sarjapura Road (Srirampura, Rayasandra and Gattihalli).

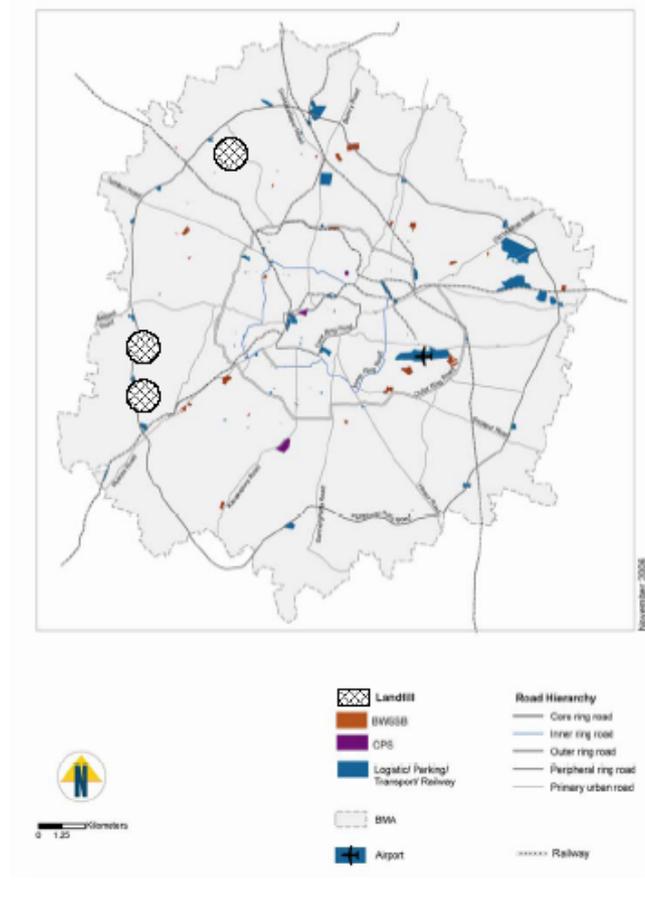
2. Sanitation

The combined effect of service deficiency in the sanitation, solid waste manage and drainage is severe – and particularly pronounced in surface and ground water pollution and unsafe waste disposal with adverse health impacts. While health statistics do not clearly indicate the impacts of poor sanitation, air and water quality data show signs of pollution in the city environs. The status of sanitation in the city is described in the three sectors below:

Sewage. The number of households connected to the sewage network increased from 157,000 in 1991 to 344,000 in 2001, and the population grew from 18.9% to 30%. The significance of this rate, which just concerns the connections to the formal well-to-do category of the population, indicates, the lack of sewage network on one hand and on the other, the fact that often covered storm water drains are used for sewage disposal. The result is that about 70% of the BMP population uses a drainage system that translates to a geographical area of about 40% of the total LPA area. The problem of sewage, linked with the problem of access to potable water, is a major concern for the city.

Solid Waste Disposal. The production of waste in Bangalore is approximately 2200 tons per day, with 0.4 kg of waste produced per day per person. While collection is carried out regularly, waste treatment is an issue of concern. Only 300 to 350 tons of waste is currently treated every day for composting and the remaining waste is disposed in an unhygienic manner. At present the City has treatment and disposal facilities with combined capacity of 2000 MT and 1600 MT, respectively. New dump sites and landfill sites are to be identified and developed to serve the purpose.

Drainage. The growing geographic spread of Bangalore and accompanying construction activity has interrupted the natural valley system of the region. Construction has also resulted in filling up small water bodies and low-lying areas. The flooding of drains during each monsoon exposes its poor state and their inadequate capacity, and impacts the City's overall infrastructure. With the growth of the City, the number of lakes has reduced to 64 from 400, and small lakes and tank beds have vanished because of encroachment and construction activities. This has resulted in storm-water drains reducing to gutters of insufficient capacity, leading to flooding during monsoon. Dumping of municipal solid waste (MSW) in the drains compounds the problem and leads to blockages. To control floods, it is important to remove silt and widen these storm water drains to maintain the chain flow and avoid water from stagnating at one point.

Figure IV-6: Sanitation Infrastructure Facilities

Safe sanitation and solid waste management are therefore key challenges in the near future. A key aspect of a strategic approach to sanitation is planning of the sewerage system in tandem with the Storm Water Master Plan to integrate wastewater and storm water discharge. On the basis of the analysis and consultations in preparation of this Master Plan, the BBMP and the BWSSB will be working towards the following **strategic outlook**:

- Safe sanitation facilities are accessible by all citizens and municipal waste management covers the entire city.
- Public awareness is increased of safe sanitary practice and of citizens' responsibilities to achieve and maintain hygienic environment.
- Municipal waste management practices conforming to the MSWM Rules, 2000.
- Appropriate options for wastewater recycling and reuse are introduced to supplement water for non-domestic usage.
- Storm water runoff is appropriately collected and discharged into natural drainage channels.
- Encroachments are relocated to safe areas thereby ensuring that aspects of health and safety are adequately addressed.

Across the sub-sectors identified pertinent to this goal, systematic and phased investment will be necessary. **Significant actions** to meet the sector strategic outlook comprise:

- Phased development of the sewerage system, conforming to urban densification and treatment options based on appropriate recycling and reuse technology is critical from a long-term service provision perspective.
- Development of the Storm Water Master Plan and the remodeling of drains by BBMP.
- Procurement of waste collection and transportation vehicles and equipment to ensure 100 percent waste collection and disposal will proceed, as well as construction of sanitary landfill to dispose rejects.
- Construction of roadside drains, desilting of existing natural drainage, and construction of a protection wall along drainage channels to check soil erosion.

The total cost of significant actions over the Master Plan/JNNURM period is approximately Rs. 35.6 billion.

3. Water Supply

Water supply is a key concern when it comes to the problem of the city's infrastructure. The quantity of water available for Bangalore is currently 712 MLD (million litres per day). Considering general losses estimated at 30% and water used for industrial needs, about 6 million people share the remaining 500 million litres. This amounts to an average of 80 lpcd (litres / person / day), which is lower than the minimum required standards. But these figures do not correspond to the reality, as there is a considerable loss in water due to wastage and leakages on one hand and on the other, many industrial units have private pumping systems that tap into and deplete the ground water resources. Thus, the problem of water is one of the major challenges the city is confronted with; at present the situation is worsening.

Box 4: Disparities in Access to Potable Water

Potable water supply is, by far, the most sought after service by the population and one, which has the biggest impact on living conditions. Between 1991 and 2003, the "Metered domestic connections" increased from 213,000 to 400,000, an increase in the connection from 25% to 35%. This progression indicates the efforts undertaken by the BWSSB.

There are major disparities regarding access to potable water in the city. The BMP area is generally well connected, however, the CMCs area and villages have less than 10% individual connections to the Main system and a majority of households have recourse to bore wells and collective water supply because of the absence of a networks. This overall situation reveals that it is imperative to improve access to potable water for households and improve the sanitary conditions of those who are deprived of a house connection. Irregular water supply and the need to store it create problems of hygiene. These risks are high in the poorest residential areas and in the slums.

Another major concern is that scarcity of water which has encouraged water consumption by tapping ground water resources, and this represents about 30% of the city's water resources. About 5,850 bore wells and 15,180 public taps that pump water from the ground are maintained by the BWSSB in the city. This does not take into account pumping of water by private parties who pump water from within the agricultural land zone.

The Bangalore Water Supply & Sewerage Board (BWSSB) provides water supply and sewerage services in Bangalore. Though initially restricted to the area under BMP's jurisdiction, BWSSB is progressively increasing its services coverage area to the entire Bangalore Metropolitan Area. CMCs and TMC currently manage their drinking water and sewerage needs on their own.

Figure IV-7: Water Supply Infrastructure – STP



The **strategic outlook** of the Master Plan in fostering Bangalore's growth based on water supply services depends on the BWSSB achieving the following:

- Ensuring that water is accessible to all citizens on a continuous basis, everyday;
- Ensuring that the quality and quantity of water available to citizens conforms to the Central Public Health and Environmental Engineering Organization (CPHEEO) standards; and
- Ensuring that full cost of water service is achieved by the year 2015 and the funds utilized for long-term asset strengthening and management.

In addition to developing the Bangalore Water Supply and Environmental Sanitation Master Plan, BWSSB has also undertaken steps to develop and design two key projects for the water and sanitation sector impacting the service levels in the city and the peri-urban area. The Greater Bangalore Water and Sanitation Project (GBWASP) and the bulk water supply augmentation project – Cauvery Stage IV, Phase II – are two of the key projects that BWSSB has undertaken. While the former sources financing through infrastructure bonds and the World Bank, the latter sources finances from the JBIC.

Significant actions arising from the sector strategic outlook comprises:

- (i) Medium-term Steps. In the medium-term, undertake leak detection and rectification of the distribution system (initially in pilot zones and subsequently scale it to the city-level), energy and water audits to reduce water losses and utilize saved water for distribution across the city.
- (ii) Holistic Planning for Water Services. Whereas practical operations at times require area or functional specialization, it is necessary to take an integrated look at sector priorities, options, systems and data. The BWSSB will lead the introduction of a more integrated approach, covering the water demand requirement of the core-city and peri-urban areas, and linking system information on the GIS-based city maps for long-term asset management and strengthening.
- (iii) Augmentation and Rehabilitation. A combination of new investments and expansions of existing ones is needed, within the framework of an integrated strategy to increase and improve the quality of supply. Project details are outlined in the City Development Plan, but in essence the strategy entails augmentation of water supply and rehabilitation and improvement of existing treatment facilities to address water demand and quality standards.
- (iv) Public Awareness. Introduction of awareness campaigns is a core element of the way forward, especially to promote water conservation and associated techniques, monitoring rainwater harvesting practices in households with specific emphasis on apartment blocks, and create knowledge that would empower the public to hold providers to account.
- (v) Revenue Enhancement and Cost Recovery. Based on an internal Financial Improvement Action Plan to ensure full cost recovery services by the year 2015, BWSSB will undertake measures to index water tariffs and undertake a path for progressive movement towards cost recovery. BWSSB will also have to begin to analyze the various components of costs as a basis for improvement in cost recovery, and as part of the accounting, financial improvement and institutional reform measures will be investigated that will assist in this respect, while technology (meters for example) will be extended in a phased manner.

The cost of significant actions over the Master Plan period is approximately Rs. 6000 million, excluding project costs for GBWASP and Cauvery Stage IV, Phase II.

4. Energy

Bangalore was electrified in August 1905, drawing power from Shivanasamudram generating station through two 35 kV transmission lines. As the demand increased, the transmission voltage was upgraded to 78 kV in 1920. Three sub-stations were established as 'A' station, 'B' station and 'C' station to transmit the power. The power consumption in Bangalore during this period was 2.5 MU and the maximum demand was 100 MW.

During 1950, a 66 kV ring main concept was initiated with six 66/11 kV sub-stations of 2x15 MVA, each, transmitting power to various parts of Bangalore. With the commissioning of the Sharavathi generating station in 1964 and the subsequent commissioning of 220 kV Sub-Station at Peenya in 1965, additional power was supplied through the 66 kV ring main sub-stations. Growth in industries, educational institutions, and housing was governed by the availability of ample power at reasonable tariffs and the salubrious climate during the 1960s. The 66 kV ring main sub-stations largely helped to establish a stable power system, capable of supplying power to EHT consumers, and a large number of commercial and domestic consumers in the city. A satisfactory voltage was achievable with adequate power availability with minimum power interruptions.

However during the late 1960s imposition of restricted power supply and industrialization affected power supplies and availability. Sub-stations were added rapidly for catering to major industries like ITI, HAL, BHEL, etc. (in the 1960s and 1970s). The latter part of the 1980s witnessed the advent of IT and BT firms, which established their research and development centres in Bangalore due to the favorable policies of the Government. Bangalore also witnessed substantial vertical growth and rapid immigration during this period. The density of power increased enormously and studies indicated that the power load growth of Bangalore Urban and Rural Districts was expected to grow annually at 8.04% and 9.93%, respectively. However, the actual load growth in the Bangalore Urban District itself was 15-16%.

The Karnataka Power Transmission Corporation Limited (KPTCL) is responsible for power transmission in the State. Growth in consumption, maximum demand and sub-stations to facilitate the power supply in Bangalore Urban and Rural Districts between FY2001 and FY 2007 is indicated in **Table IV-6**.

Table IV-6: Power Supply Facilities

Year	Energy Consumption in MU	Max Demand in MU	400kV Sub-Station	220kV Sub-Station	66kV Sub-Station
2000-01	5,291	1,070	3	11	68
2001-02	6,061	1,216	3	11	70
2002-03	6,082	1,382	3	11	73
2003-04	6,624	1,570	3	11	79
2004-05	7,877	1,785	3	11	82
2005-06	9,353	2,028	3	11	85
2006-07	10,476	2,305	3	12	96

The Bangalore Electricity Supply Company (BESCOM) is responsible for power

distribution in the Bangalore Metropolitan Area (Urban District) and the Bangalore Rural Area (Rural District) – both areas comprising the Bangalore Metropolitan Region. **Table IV-7** indicates the distribution of consumers in the Bangalore Metropolitan Region.

Table IV-7: Power distribution in BMR

Type of Consumer	Bangalore Metropolitan Area (million)	Bangalore Rural Area (million)
Domestic	2.305	0.600
Commercial	0.348	0.048
IP sets	0.011	0.114
LT Industries	0.082	0.026
LT Water Supply	0.007	0.006
Street Lights	0.005	0.004
HT Industries/ Commercial	0.003	0.001
Total	2.761	0.799

Figure IV-8: Power Infrastructure in the Bangalore Metropolitan Area

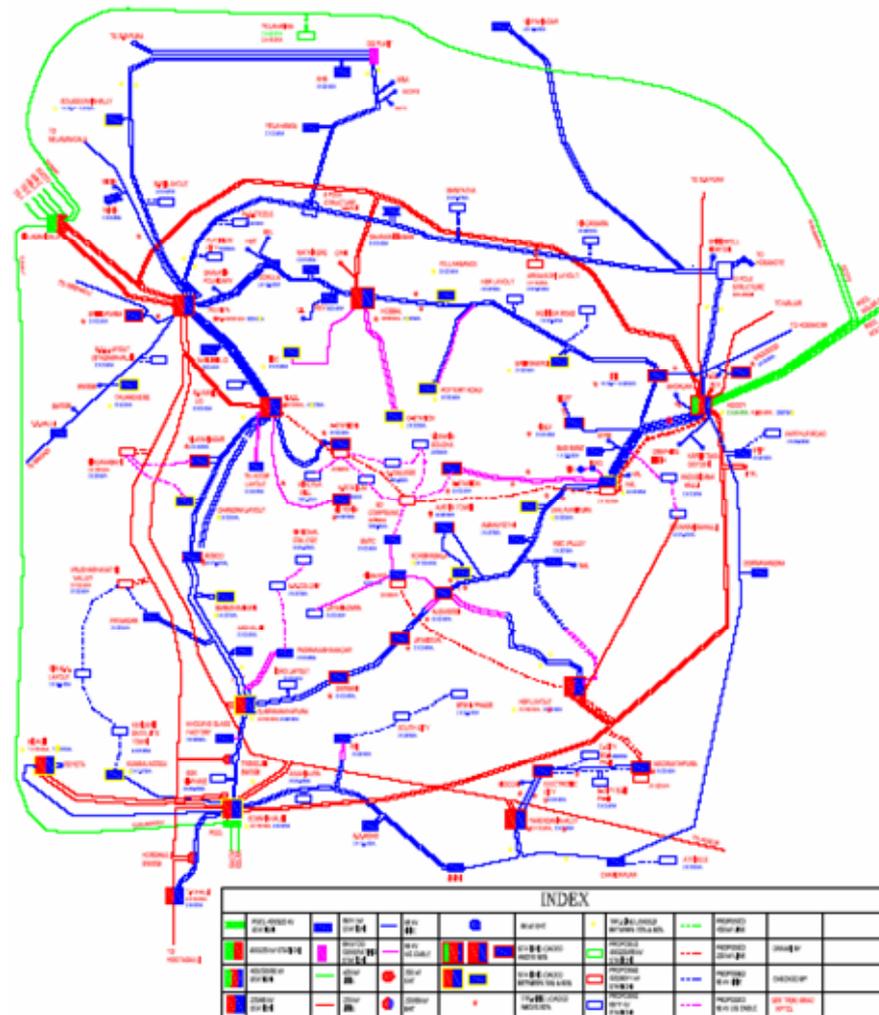


Table IV-8: 11th FYP Forecast for Power in BMR

Year	Energy Consumption in MU	Max Demand in MU	400kV Sub-Station	220kV Sub-Station	66kV Sub-Station
2007-08	11,374	2,582			
2008-09	13,142	2,891			
2009-10	14,791	3,238			
2010-11	16,486	3,627			
2011-12	18,465	4,015	2	13	56

With power demand showing upward trend, KPTCL proposes to step-up the power generation and the organization is in discussion with private power producers like M/S NPCL, M/S Suzlon, etc. for additional power. **Significant actions** by KPTCL and BESCOM will involve establishing infrastructure indicated in the 11th FYP document and upgrading operation and maintenance facilities. In addition, KPTCL will focus on:

- (i) Infrastructure. ensuring complete automation of transmission and distribution functions, ensuring open access in full form and hassle free third party access, and ensuring nil transmission constraints.
- (ii) Retail and Consumer Care. Ensuring that distribution is purely a wires business and retail supply a trading activity, providing the consumer the freedom to select retail supplier, ensuring that the system has nil potential interference and commercial loss, ensuring that distribution loss is at the minimum level comparable with international standards, and ensuring that the customer care and service will be the sole criteria for survival of the supply companies.
- (iii) Financing. Undertaking competitive power trading, leveraging hourly power purchase, reducing dependence on Government for finances, involving public participation through issue of Initial Public Offering (IPO), and introducing accountability in the power sector.

Over the 11th FYP (2007-12), the power sector will undertake the following activities:

- Manage the Rural Load Management Systems (RLMS) to ensure 24 hours of uninterrupted power supply to all consumers in rural areas and regulated power to IP consumers.
- Re-conductor old lines and use of appropriate quality conductors for future transmission and distribution.
- Optimize load on distribution transformers by taking appropriate action on overloaded and under loaded transformers.
- Undertake construction of sub-stations at identified load centres.
- Undertake power supply to rural households under the Rajeev Gandhi Grameena Vidyuth Yojana (RGGVY).

Over the following three years leading through FY2010, KPTCL proposes to invest Rs. 16600 million to meet the BMR power demand.

C. People and Well-Being

1. Urban Community Upgrading

While Bangalore's employment increased twice as much as the population and incomes increased three times faster than the population, the inequality of this latest growth leads to the increased difficulties for the urban poor. However, the key challenge remains growth devolution to all sections of the society. As per the 2001 census, the slum population in the erstwhile BMP area is 430,000, which is about 10% of the total BMP population of 4.3 million. The increase in number of slums in Bangalore is a problem that has not yet been completely addressed. However, growth in poverty levels is mitigated to some extent due to availability of jobs provided by the growing Services sector.

The Karnataka Slum Clearance Board (KSCB) has focused on improving the amenities in slums to address basic issues relating to urban poor. The JNNURM CDP has taken into account all slums spread throughout Bangalore (encompassing area under the BBMP, including erstwhile City Municipal Councils and Town Municipal Council). The total number of slums captured in the survey is 542 and the number of households proposed to be redeveloped is estimated to be 217,257 (refer **Table IV-9**).

Table IV-9: Slums in Bangalore

Agency	No. of Slums	No. of Households	Remarks
KSCB	218	106,266	<i>Declared</i>
BMP	169	73,048	<i>Undeclared</i>
CMC and TMC	155	37,943	<i>14 (D) and 141 (UD)</i>
<i>Total</i>	542	217,257	

Source: JNNURM CDP.

Urban poor communities in Bangalore are characterized by:

- Poor sanitation with over 50 per cent of the households without latrine or drainage;
- High illiteracy rates which are three times as high as in non-slum areas;
- Higher infant and child mortality rates than the urban averages;
- A higher proportion of especially disadvantaged groups;
- A low level of utilization of existing services (such as maternal and child health care); and
- High initial enrollment in primary education, but a high drop-out rate (20%-50%) in particular among the girls.

A focused attention is required to integrate development of basic services to the urban

poor and the **strategic outlook** to this sector is derived from the JNNURM that advocates:

- Providing basic services to the urban poor including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery through convergence of other already existing universal services of the Government for education, health and social security;
- Ensuring that care will be taken to see that the urban poor are provided housing near their place of occupation;
- Securing effective linkages between asset creation and asset management so that the basic services to the urban poor created are not only maintained efficiently but also become self-sustaining over time;
- Ensuring that adequate investment of funds to fulfill deficiencies in the basic services to the urban poor – thereby ensuring that funds from both centrally and state sponsored schemes are appropriately channelized; and
- Scaling-up delivery of civic amenities and provision of utilities with emphasis on universal access to urban poor.

Poverty is addressed through a multi-pronged and inclusive strategy that focuses on upgrading, regularization, institutional reform and making the voice of poor people heard in planning for the future, project identification and monitoring of services. **Significant actions** proposed during the Master Plan period shall include:

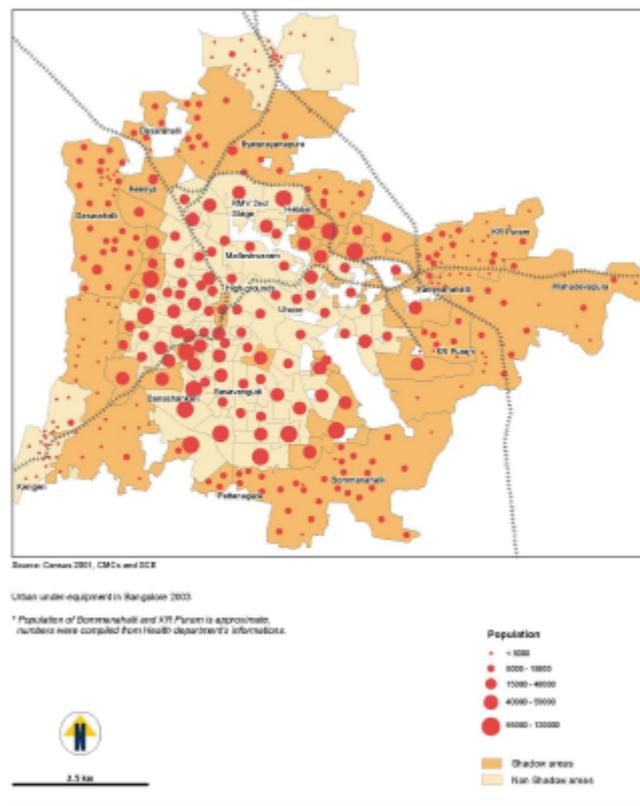
- (i) Database and Tenure Security. All slums and dwellers listed and land tenure issues addressed. All urban poor areas/slums will be listed through a detailed survey and residents will be registered. Before starting slum networking activities, the BBMP and KSCB will create a baseline database on existing situation of services at the slum-level through a detailed survey.
- (ii) Institutional Structure. An institutional structure is established to address channelizing and effective utilization of funds for community infrastructure and livelihood development; the communities will access and utilize the funds based on community-level participatory planning.
- (iii) Slum Networking. All slums are networked with community infrastructure services and the BBMP undertakes infrastructure development in a designated number of slums annually. Community participation is an integral part of the slum networking process through planning, implementation, monitoring, and maintenance. The BBMP will ensure that people are an integral part of the decisions about their living environments and the services they will access. In part, formal systems such as those proposed in the draft Community Participation Law – area sabhas, for instance – may be part of this institutional architecture. In addition, slum upgrading and poverty alleviation programs will work with poor people to explore ways and means to achieve optimal benefit from wage employment by contributing labor during the implementation of projects at the community-level.

- (iv) Knowledge Sharing. A platform for knowledge sharing is developed at the city-level and an institutional support for CBO operation established.
- (v) Capacity Building. Adequate capacity building and training options developed and Livelihood Development Centres established.

2. Basic Health

Infant mortality is one of many indicators for assessing the health situation in cities. Bangalore's figure for rate of infant mortality is 24 out of 1000 (67/1000 for the whole of India), which is relatively good. According to the BCIP data, life expectancy has grown from 65.8 to 70.2 years, a positive result even if the question of social inequalities is a deciding factor. Although the mortality rate for the first five years is 43 per thousand, there has been a clear decline since 1991. Health infrastructure and facilities have improved and today Bangalore has high quality super speciality health institutions compared to other big cities. The number of hospital beds for 1,000 people have increased in ten years from 2.4 to 4.08. Access to different levels of health care (primary, secondary, tertiary) is generally satisfactory in spite of the shortage of amenities in the poorer areas such as Kempapura Agrahara and Baiyyappanahalli, etc and the concentration of facilities in the city's core area in relation to the peripheral areas. Nearly three fourths of health services is provided by the private sector while the health services offered by parastatal agencies play an important role at the primary level and needs greater attention. Areas deficient in health and education in the city is depicted in **Figure IV-10** as Shadow Areas.

Figure IV-10: Shadow Areas



Bangalore's natural advantages, connectivity, and climate form an excellent base on which to develop a base of healthcare/medical facilities/tourism. The strategic outlook related to improving basic health in the city would entail building upon the base of excellent hospitals and medical care already available, and undertaking some of the possible developments enumerated here:

- Clean environment, with green spaces, parks, and gardens;
- Revival of lakes and water bodies; and
- Focus on developing special areas/facilities for medical care and rehabilitation.

Here again, the City would play a facilitator's role by setting the base infrastructure and planning/zoning. The private sector would be encouraged to invest in the actual projects/facilities. To make Bangalore a centre for healthcare, the following **significant actions** are imperative:

- Providing affordable medical facilities and promoting alternate therapies;
- Providing high quality ambience and high quality infrastructure amenities;
- Facilitating emergence of budget accommodation and making available low rental/budget accommodation; and
- Facilitating availability of excellent transportation facilities.

3. Education

Bangalore, known for its high quality educational system and training institutions has about 80% literacy rate, which is high in comparison with the state average of 67%. The numbers and reputation of universities, engineering colleges and other training institutions confirm, beyond the boundaries of the State, the popularity of the Capital as a destination for quality educational facilities. However, basic education remains a concern for this city that claims to be an international metropolis in the field of high technology. At the city level, the existing norms (number of students per institution) for higher primary schools (1.64) and for high schools (3.15) are higher than that of primary schools (1.04). Primary level education faces unfavorable conditions as compared to secondary and pre-university level education, which benefit from more facilities. With a ratio of one primary school for 2450 persons and 32 students per teacher for the primary level (compared to a generally accepted average of 40 students per teacher), the situation seems quantitatively satisfactory. However, the major problem is the ratio of public and private educational facilities. Private schools represent 75% of institutions and this is a concern for all the categories of the population. Public institutions have limited resources and their objective is to eliminate illiteracy particularly among the poorer section.

The **strategic outlook** of the Master Plan will be to promote Bangalore as a centre of excellence in education and strengthen existing institutions to cater to future requirements. **Significant actions** shall expect the city to play the role of a facilitator to catalyze the development of educational institutions, while the actual education infrastructure would come from private finance. In some cases the city may also lobby with the State or Central Governments to locate specific centers of excellence in

Bangalore. The Master Plan makes provisions for land in urban corridors for enhancing the number of players that can enter the domain of education, and will provide for land banks for educational institutions.

4. *Fire Services and Disaster Management*

According to the National Policy formulated by the Government of India, the fire services will be transformed into a Multi Hazard Rescue Service. The fire services will be expected to address natural hazards like earthquakes, floods and cyclones. The national-level Standing Fire Advisory Committee (SFAC) indicates that urban areas having a population of more than 200,000 should be given priority for setting up fire services and among those, cities having industrial establishments of national importance should be accorded utmost priority. The SFAC has laid down the norm of establishing at least one fire station in a 10 km radius for urban areas and has indicated that the fire department should also handle natural and anthropogenic disasters including fire emergencies.

- **Trends in Fire Accidents.** During the last decade, KSFES received about 900-1000 calls annually. During the years 2004 and 2005, the majority of the calls (90%) received have been for small fires and emergencies. There was a reduction in medium to serious fires from 38% in 2001 to 8% in 2005.
- **Source of Fire.** The fire accidents in the residential properties account for nearly 25% of the total accidents. The fire accidents in the commercial and industrial sectors put together account for 25% of the total accidents.
- **Types of Fire Accident.** Fires under the category, gas and electrical account for 37% of the total annual fire accidents.
- **Human Lives Saved.** During the last decade the number of lives involved in the fire accidents has decreased considerably (7 per 100 accidents in 1995 to 4 per 100 accidents in 2005). The number of lives lost has significantly reduced.
- **Properties Saved.** There is an increase in the overall properties involved in the fire accidents annually but the amount of property saved shows a fluctuating trend.

Infrastructure. There are 11 fire stations in Bangalore Urban District, which serve the needs of Bangalore City. There are also four fire protection squads and two workshops that support fire services. The training academy called RA Mundkur Fire & Emergency Services Academy is located on Bannerghatta Road. The details on number vehicles are indicated in **Table IV-10**.

Table IV-10: Types of Vehicles

Type	Nos.
Water Tenders	22
Water lorries	10
Water Bouzers	2
Rescue Vans	1
Snorkel & TTL unit	2
Towing tenders	10
Jeeps & Cars	21
High Pressure pumps	2
Portable pumps	20
Ambulance	2
Agni unit	2
Foam tenders	2

Source: KSAFE.

Key issues faced by the fire and emergency services department comprise:

- Lack of high tech hydraulic platforms to cater to the needs of high rise buildings.
- Lack of high tech Hazmat – cum- rescue vans, specialized rescue vans, foam tenders, water bouzers, water tenders, SAR equipment, proximity suits, NBC disaster mitigation equipments etc.
- Lack of equipment that facilitates real time fleet management, disaster monitoring systems, GIS / GPS that facilitate creation of a Command & Control System for a city that is expanding horizontally& vertically.
- Lack of scientifically drafted training and capacity building programs on new equipment.
- Lack of trained manpower.
- Creation of RDBMS (data management system) as Intelligent Management Information System with information on employees, vehicle history, fire & emergency calls, inventory etc
- Data base comprising standard operating procedures, statistics & specifications.

The **strategic outlook** of the Master Plan in relation to Fire and Emergency Services and the Vision of the department comprises:

- The department aims to provide effective Fire Preventive, Fire Fighting and Safe Evacuation measures to Life and Property in Bangalore Area;
- Within a minimum response time of three minutes, by zoning the Bangalore Area based on nature of fire risks;
- Enhancing number of fire station by scientifically designing and locating the fire stations, along with need based hi-tech vehicles and equipments;
- Imparting a state of the art advance training to personnel and officers;
- Adopting fleet management and location finding gadgets to all emergency

vehicles;

- Adopting a static as well as mobile command and control systems,
- Procuring multi-role and all rounder vehicles and equipments;
- Bringing all the fire station and other allied agencies under a computer network for disaster management and real time management of a situation;
- Standardizing the operational procedures;
- Overall improving the service conditions by means of reforms in the department; and
- To live up to the expectation of the dictum “We Serve to Save”, both during peace as well as war times.

Significant actions arising from the sector strategic outlook comprises:

- (i) Expansion of services. To urban and rural areas in Bangalore, BMP, CMCs and TMCs so as to provide equal opportunity to all to receive this service, including augmentation and upgradation of existing fire stations and equipment.
- (ii) Equipment. Procurement of equipment and vehicles including multi-role vehicles, communication and monitoring equipment advanced Search & Rescue (SAR) equipment.
- (iii) Modernization. Overall modernization of the systems and functions, communication and monitoring, maintenance, including infusion of new technologies – command and control system, GIS/GPS, water mist technology, airborne fire and rescue operations.
- (iv) Skill enhancement and capacity building. Infrastructure, curriculum and training on computerization, adopting cutting edge technology and specialized tasks.
- (v) Appointing and Training personnel. The future emergency calls will be of multi-hazard nature and the personnel shall be trained to handle multi-hazards and each fire station shall be a ‘multi-hazard response unit’.
- (vi) Reforms. Changes in institutional set-up, standard operating procedures, enforcement of rules and regulations related to multi-storied buildings, petroleum, explosive and chemical storages, financial allocation for research and development.

D. Leisure, Recreation, Art and Culture

1. Recreation and Sports Facilities

Bangalore City occupies a prime place in the sporting arena of the country having

produced several Olympians, World Champions and International sportspersons. The city has exclusive international standard sporting facilities for Cricket, Football, Badminton, Hockey and Lawn Tennis. Sri Kanteerava Sports Complex, Indoor Stadium and number of Swimming Pools around the city have been centres of sporting activities. The Centre of Excellence of Sports Authority of India with facilities for training Indian teams for international competitions has added a new dimension in terms of facilities and human resources for sports promotional activities in the City.

The exclusivity and speciality of these infrastructures have ironically restricted the access of these facilities to common people, for those who are not pursuing sports seriously. Above all, most of these facilities are located in Central Bangalore, further limiting reach. Most of the extensions in the city lack space for sports and physical activities.

Bangalore City is growing both vertically and horizontally with few play fields for the increasing population. Gardens and parks are generally overcrowded. Private Clubs with gym facilities are mushrooming across the city but catering to those who can afford them. The strategic outlook for Bangalore to develop its recreation and sports facilities focuses on:

- Availability of a good play field of minimum 4.5 acres (in each extension) for every 50,000 persons;
- Space for creation of facilities for Basketball, Volleyball and other small area games; and
- Creation of gym facilities in all the extensions with necessary equipments at affordable user charges.

In addition to the parks developed by BDA, the city will consider developing a Sports City with good sporting and hospitality infrastructure by reserving about 150-200 acres of land to providing sports and recreation facilities for national and international events.

2. Artistic and Cultural Development

Karnataka attracts over 0.5 million foreign and 27 million domestic tourists annually. Tourism, when promoted efficiently, would be a growth engine for the entire State, with proven examples across the world of economies thriving only on this sector. At the same time, it is imperative that the heritage structures are preserved from the impacts of rapid urbanization. Key activities include:

- Branding and "top-of-the-mind" recall;
- Promotional activities for establishing the image of the city as a tourist destination;
- Developing the image of the city as a health and wellness centre;
- Promotion of theatre festivals, Bangalore Habba, museums in the city;
- Promotion of Meetings, Incentives, Conventions and Exhibitions (MICE) related tourism;
- Setting in place efficient support infrastructure including key transport linkages – air, road and rail;

- Promotion of theme based tourism, travel circuits, and new attractions;
- Private participation in provision of infrastructure facilities;
- Develop adequate support infrastructure viz., basic amenities, transportation facilities and information kiosks; and
- Build the capacity of implementing agencies and service providers.

In order to showcase the region's culture and heritage, and more importantly, to preserve the memoirs of Bangalore, the **strategic outlook** for the sector comprises conservation of all architectural and heritage monuments in Bangalore and promotion of Heritage Tourism to showcase the region's history and culture. **Significant actions** proposed comprise:

- (i) Renovation of Heritage Buildings. It is proposed to renovate the 300 heritage buildings in the City in two equal phases at an estimated expense of Rs. 1.5 million per building for renovation.
- (ii) Development of Cultural Centers, Convention Centers, Budget Hotels. Key initiatives comprise: (i) developing nine cultural centers during the JNNURM implementation period at an estimated expenditure of Rs. 10 million for each cultural centre; (ii) developing four convention centers at an estimated expenditure of Rs. 40 million for each convention centre; and (iii) developing four budget hotels at an estimated expenditure of Rs. 20 million for each hotel.
- (iii) Tourist Infrastructure Facilities. It is proposed to develop twenty tourist facilitation centers at an estimated expenditure of Rs. 0.5 million for each centre. It is proposed to procure Volvo buses under the project at a cost Rs. 6.5 million per unit tourist shuttle. It is proposed to develop nine information kiosk project at an estimated expenditure of Rs. 1 million for each project.

V. LAND USE AND ZONAL REGULATIONS

A. Overview

Drawing from the directive principles of the Master Plan and the service delivery requirement for the city, the proposed land requirement for the Bangalore Metropolitan Area is based on the extent of development in the conurbation area and provisions for agriculture land within the context of developments along the Proposed Peripheral Ring Road and influences of the Bangalore-Mysore Infrastructure Corridor Project. The land requirement is detailed in **Table V-1** and the land use distribution for the conurbation area is detailed **Figure V-1**.

Table V-1: Projected Land Requirement at the BMA level

Specification	Area in sq. km	Distribution
Conurbation Area	800.00	61.20%
Agriculture Land	419.50	32.10%
BMICAPA	87.50	6.70%
<i>Total</i>	<i>1307.00</i>	<i>100.0%</i>

B. Zonal Regulations

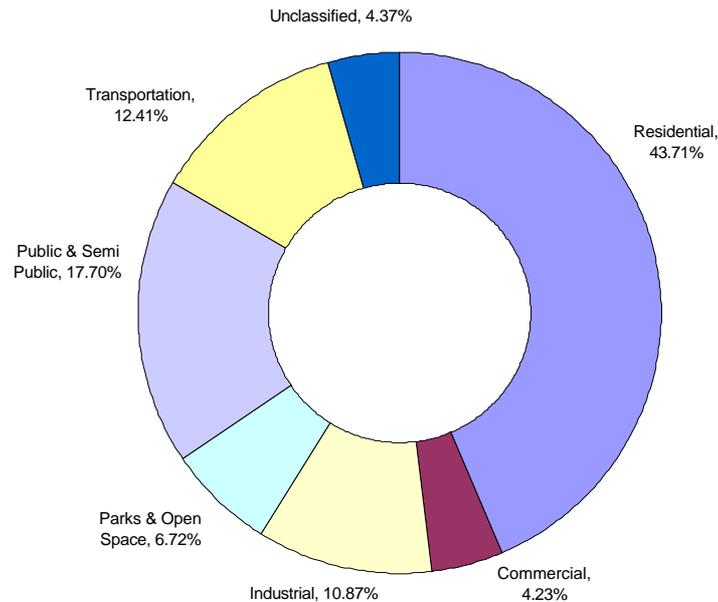
1. Local Planning Area

The entire Local Planning Area of BDA is categorized into three major areas for the application of zonal regulations, and consists of:

- (i) Main Area. This category of the city has been grouped into five areas for regulations and comprises: (i) Old Urban Areas, including the petta zone and traditional area zone; (ii) Urban Redevelopment Areas, including MG Road Area, CBD Area, CD Precinct, Transformation/Development Area, and Mutation Corridor zones; (iii) Residential Areas, including mixed residential area, mainly residential area, and commercial axes; (iv) Industrial/Activity Areas, including Industrial, High Tech, and Logistic/Transportation Zone; and (v) Green Ares, including Protected Land, Restricted Development, and Agricultural Land zones
- (ii) Specific Areas. This category refers to the areas that are not covered by the main areas and comprises large public and semi public infrastructure; large transportation structures, dedicated land uses, scheme areas, and heritage conservation areas.

- (iii) **Constraint Area.** This category refers to the areas, which have restrictions on type of development with its internal technical rules determining regulations within the site and around. As these constraint areas are determined by specific acts/legislation, the development controls follow these requirements. The following are included within the constraint areas: height restriction areas and right of way and right of user areas.

Figure V-1: Proposed Land Use Distribution in Conurbation Area



2. Zonal Boundaries and Interpretation

The exact location and specific regulations applicable for a particular zone is to be verified from the Land Use Zoning Maps (Planning District Maps). However, as an overview, the following shall guide the interpretation:

- (i) **Zonal Boundaries.** The zonal boundary is usually a feature such as a road, valley, village boundary, etc. and includes the immediate inner edge of the area. The zone is codified through use of color and symbol such as Ca, Db, etc. as indicated in the legend on the maps.
- (ii) **Specific Perimeters.** Specific perimeters as shown in the legend include planning schemes such as Coordinated Planning Schemes (CPS), etc. This has been demarcated and integral part of the land use zonal map. The prescribed regulations motioned in the specific area chapter are applicable.

- (iii) Constraint Area Zonal Boundaries. The symbols shown in the legend represent the areas marked for such purpose and refer to non buildable or non developable areas. In case of uncertainty as regards the boundary or interpretation, it shall be referred to the authority for final decision.

3. Usage of the Zonal Regulations

While all Land Use Zonal Regulations are specified and detailed in **Volume 3** of the Master Plan, the following are preliminary steps to be taken for ascertaining the zone and applicability of the regulations on the given development:

- Ascertain the correct location of the site on the Land Use Zoning Map using the correct Sy.no or the latitude – longitude co-ordinates;
- Identify the zone within which the site is located – such as Da, or Ca, etc. on maps;
- Read the relevant zone contents from this report;
- The Permissible land uses categories are given as code – please refer to the table covering relevant land uses (such R1 for residential uses) and permissible ancillary land uses, on table 28;
- Where a common table is provided, please read the notes given specific to the table – such as main roads may have special significance as per widths;
- The plot sizes and relevant FAR table is provided for each zone;
- The parking norms are to be followed;
- In case of specific areas, the sanction shall be based on the program content of the development; and
- For developments in the constraint areas, the permissions/NOC from the concerned authority is to be obtained before applying for sanction. The Permissions and sanction shall be based on decision of the Authority.

C. Changes to the Master Plan

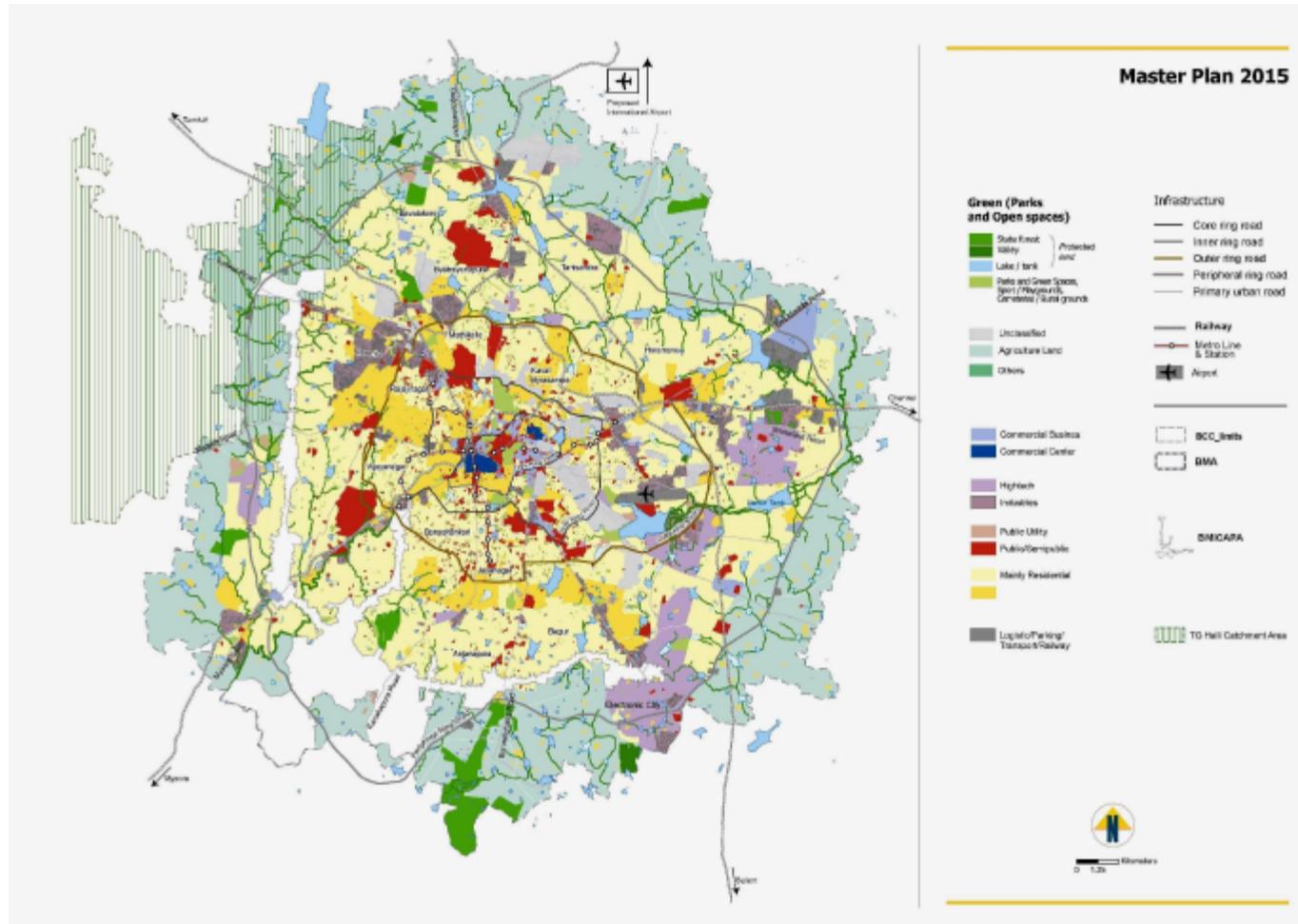
The following changes have been made based on public consultations, the Advisory Committee Report, and based on the proposed service delivery projects:

- Inclusion of the Outer Ring Road missing link and the NH 7 Link Bypass road (Yelahanka to NH7), Airport Link Road (Expressway),
- Inclusion of the Hi-Tech Corridor;
- Inclusion of Arkavathy layout
- Change of land use nomenclature based on the KTCP Act;
- Inclusion of plans and proposals of the BWSSB, BMTC, BMP (landfill sites and parks), Forest Dept (State Forest), KIADB;
- Inclusion of the Metro Rail alignment;
- Incorporation of features in the BMICAPA;

- Incorporation of layouts, group housing, and Development Plans;
- Inclusion of the Proposed PRR and Truck Terminals;
- Inclusion of Valley conservation;
- Inclusion of 1995 RCDDP Conurbation Area as per Advisory Committee Recommendations;
- Correction of Cadastral defects;
- Removal of Proposed Isolated Developments;
- Removal of parks in private lands;
- Removal of CPS;
- CPS – BDA Scheme;
- Affected legend change;
- Planning districts; and
- Inclusion of information from Public Sector Units: CRPF, BEL, ITI, DRDO, and Bangalore University

Based on the above approach, the proposed Land Use Plan is indicated in **Figure V-2**. Details of the Land Use Plan are available in **Volume 2** of the Master Plan.

Figure V-2: Proposed Land Use for BMA



VI. PLAN REVIEW AND MONITORING

A. Introduction

Plan monitoring is essential to evaluate the changes required to improve the quality of life in the city. Introduction of a robust benefit monitoring program makes the Plan responsive to the emerging socio-economic forces. A benefit monitoring program is required to:

- Ensure effective implementation of the Plan within the time frame to achieve the intended targets;
- Respond to the changing socio-economic needs of the people in the city;
- Check unintended growth within the city;
- Reduce time lags between various interdependent activities and reduce deficiencies in service delivery; and
- Review appropriateness of the Plan policies within the urbanizing trends.

In order to effectively monitor the Plan, the following are imperative: (i) sustainability indicators to ensure that the Plan components are adequately monitored; (ii) a structured institutional mechanism where all stakeholders of the Plan have defined responsibilities within a long-term service delivery objective; and (iii) a legal framework defining developmental guidelines and safeguard frameworks.

B. Review and Monitoring

1. Monitoring Unit

A dedicated Monitoring Unit with modern data processing facilities would be established, which would be responsible for collection and analysis of primary and secondary data and bringing to notice important changes in the Master Plan. This unit would also be in-charge of overall monitoring of implementation of the approved development plans and layout plans.

A suitable mechanism by way of a high-level committee under the Chief Secretary, Government of Karnataka is also proposed to be established for periodic review and monitoring of the Master Plan. To enable this, apart from targets arising from various infrastructure plans etc., other action points emerging from the proposals made in the Plan for various sectors would also be listed out, in order to enable monitoring of timely implementation and identifying the need for any changes / corrections.

2. Sustainability Indicators

The Monitoring Unit will review various sustainability indicators over three periods of the Master Plan – 2007-09, 2010-12, and 2013-15. The indicators shall inter-alia comprise:

- **Economy and Growth.** Population size, Population distribution in relation to holding capacity, age sex structure, household size, rate of migration, causes of migration, etc.; distribution of households by income, consumption expenditure, employment, participation rate, employment in different sectors, shifting / relocation of industries, growth of informal sector, shifting of government offices, etc.; land use pattern, development / layout plans, etc.; household with essential services; percentage trips by public transport (modal split), cost of using and operating different modes, passenger capacity and distance traveled by public transport per year in relation to population, facilities provided on railways / metro stations;
- **Environment and Energy.** Air pollution, water pollution, noise, access of population to safe drinking water, access to low cost sanitation, removal of solid waste per capita, requirement of petrol pumps
- **People and Well-being.** Slum and squatter settlements, mortality rate and infant mortality rate, distribution of police and fire services, requirement of old age homes, working women's hostels, adult education centres, etc., floods intensity areas and effected population, any other natural disasters, etc.
- **Leisure, Recreation, Art and Culture.** Stadiums built, heritage buildings conserved, etc.

C. Institutional and Regulatory Framework

1. Overview

The implementation of the Master Plan and the consequent monitoring takes cognizance of the following overlaps and lack of clarity in service delivery:

- **Traffic Management.** The area of traffic management, which is a problem in the city, is with the Traffic Police department. However, the funds for installation of traffic signals, lane marking, etc., are provided by the BBMP.
- **Road Maintenance.** Maintenance of roads is the responsibility of BBMP, BDA, or PWD, depending on the location/ jurisdiction.
- **Slums.** The improvement and clearance of slums is governed by the Karnataka Slums (Improvement & Clearance) Act 1973. In Bangalore, there are three organizations dealing with this matter - the BBMP, the KSCB, and the BDA. Though each of them is expected to take care of the slums coming under its jurisdiction, this arrangement has led to confusion, particularly in areas of doubtful jurisdiction.
- **Street Lighting.** In respect of street lighting, while the BMP carries out the

obligatory functions to meet the related expenditure, the functioning of lights and supply of power is with the BESCOM, which leads to divided responsibility.

- **Special Institutions.** The managerial responsibility in “special areas” that were formed for specific purposes is also an area of concern. For instance, the HAL Sanitary Board and the ITI Notified Area Committee are two non-elected bodies constituted under the Karnataka Municipalities Act 1964. Technically, they function outside the jurisdiction of the BBMP, and were meant to take care of the civic needs of the industrial areas. However, today there is a considerable non-industrial load, and a number of unauthorized constructions coming up because of the weak monitoring and enforcement ability of these bodies.
- **Management of Fringe Areas.** There are several legal complexities in the management of fringe areas. Several laws operate here - the Land Revenue Act, the Land Reforms Act, and the KTCP Act. Enforcement of these laws is done by different authorities like the Revenue Department, the Special Deputy Commissioner, and the BDA. While the citizen is put to hardship to obtain approvals from these Authorities, the Authorities also face problems in complying with the many legal provisions, particularly against those who transgress the law.

In the context of these inconsistencies, overlaps, organizational conflicts, managerial voids, and legal complications, the following options are being considered: (i) redefining the roles of the major urban authorities in the Bangalore Metropolitan Area, with particular reference to the BBMP, BDA, and BMRDA, to meet the challenges of future metropolitan management; (ii) tackling the managerial voids in the peri-urban/ suburban areas of Bangalore; (iii) introducing necessary legal reforms to meet the new planning and developmental needs of the Bangalore Metropolitan Region; and (iv) ensuring transparent processes, with citizen participation, in the City’s planning and governance.

2. Institutional Arrangements and Action Groups

The proposal to create the Greater Bangalore Municipal Body requires integration of the various developmental initiatives and institutional responsibilities of local self government institutions in the city. Designing and developing a seamless, effective and well coordinated management structure is therefore important for not just the Greater Bangalore Municipal Body but also for the entire Bangalore Metropolitan Region (BMR). This imminent directive also takes cognizance of the framework laid down in the 74th Constitutional Amendment Act (CAA) and the emphasis the CAA lays on planning for social and economic development. The Government of Karnataka has constituted an Expert Committee for the planned development of the **Bruhat Bangalore Mahanagar Palike (BBMP)** within the above context. The Committee is currently preparing its recommendations on the subject.

While the aforesaid committee on BBMP reviews multiplicity of functions and overlaps in service delivery, GoK has formed the **Bangalore Metropolitan Land Transport Authority (BMLTA)** for the Bangalore Metropolitan Region (BMR). The BMLTA shall function as an umbrella organization to coordinate planning and implementation of urban transport programs and projects and provide an integrated management structure. All land transport systems (excluding the railways) in the BMR shall be brought under the

purview of the the BMLTA.

3. Policy and Regulatory Framework

In addition to the recommendations on the policy and regulatory framework for BBMP, and relevant acts defined in **Table III-1**, the following frameworks shall apply to Bangalore's long-term development:

- (i) Urban Water Supply and Sanitation Policy. GoK has announced an Urban Drinking Water and Sanitation Policy, with the following objectives: (i) to ensure universal coverage of water and sanitation services that people want and are willing to pay for; (ii) to provide such services in a manner that preserves the sustainability of the precious water resources of the State, protects and enhances the commercial and economic sustainability of the operations at the same time; and (iii) to ensure a minimum levels of service to all citizens.
- (ii) Transparency and Right to Information. The State has always been ahead in terms of setting in place processes to ensure transparency in public dealings. The Karnataka Transparency in Public Procurements Act, 1999 and the Karnataka Right to Information Act, 2000 form the cornerstone of the legal framework under which Government departments and agencies have to operate. Karnataka also has the Fiscal Responsibility Act, to encourage planning and prudence in the process of budgeting. However, it is clear that going forward, the objective is not to have mandated transparency, but to have open and participative governance. This can be set in place only through an institutionalized and sustained process of interaction, as mentioned in the previous section.
- (iii) Proposed Community Participation Law (Area Sabha (Gram-sabha equivalent), Ward Committee, and the ULB). The construct is for giving citizens a greater say in urban governance. The construct would necessarily have to be accompanied by urban decentralization and a credible coordination mechanism between civic agencies. The following are in brief, are some of the action items for this framework:
 - Permanent Metropolitan Planning Committee with coordination powers: Constitution with Elected Representatives and Experts, Master Planning Procedures and Technical Groups, and completely revamped Municipality Law.
 - City Government stands as a guarantor: Direct election to Mayor, 3-tier structure of Municipality/ Ward Committee/Area Sabha, formal Citizen Participation in Municipal affairs, and mandatory quarterly disclosure of performance.
 - Co-ordination mechanisms on all Municipal Services as per Schedule XII (and Schedule XI) of the 74th CAA: Alignment of jurisdictions based on Ward Boundaries, joint budgeting/ reporting cycles, and linking reform under the JNNURM to development Projects.

VII. SUMMARY AND CONCLUSIONS

Bangalore benefits from a remarkable economic growth. It is among the top ten of the world's IT centres and is known as an international leader in services. Such advantages have brought about a rise in the city's growth rate and an improvement in the situation for the good of the people. The factors determining this growth include high quality technical training and education and the presence of prestigious public sector industries, in a good social climate and advantageous natural conditions.

Despite its unquestionable advantages, Bangalore today deals with several constraints that could compromise its urban development. The city's economic growth is not accompanied by a corresponding urban development. The gap between urban growth and the capacity of the public authorities to respond to it, in terms of infrastructure, housing, public facilities, transport and control over the urbanization process, deepens.

The challenge is to respect local characteristics while applying universal rules of urban efficiency. Therefore, urbanization rooted in the context of Bangalore must:

- Valorize its history and revitalize the pre-colonial city.
- Respect the natural environment, promote rain harvesting, protect the valleys and tanks, and safeguard the underground water resources.
- Integrate the whole society in urban development, to ensure that they are not excluded from housing, public services, water connections, etc.

Bangalore is in the midst of world-level competition and in this context the city must maintain its rank in the international arena. Universal rules that it needs to consider include:

- A city of more than 5 million persons urgently needs mass public transportation system;
- A metropolis must develop, on a priority basis, its specific functions such as business, technological and cultural innovations, and logistics, and the State;
- The city's various metropolitan functions must be organized around a centre regrouping directive activities as well as exchange, communication and cultural activities;
- A metropolis has strong tourist and cultural components;
- A big city undergoing expansion must recognize the continuous process of change of pre-existing urban fabrics. Managing such changes is the first mission of public authorities;
- A Multi-million city is structured by complementary main centres and secondary centres (at least one secondary centre for one million inhabitants). These complementary centres are integrated into the network of public transportation;
- Centralities associate public amenities and private services around nodes of transportation, in a compact and non-linear form; and

- A metropolis must be capable of bringing together the city and nature for both social and ecological reasons and also to limit natural risks that mega cities face today.

There is no contradiction between the principles of Bangalore's contextualized urbanization and universal rules of urbanization. On the contrary, by respecting its own specific principles Bangalore will be able to fare better in international competition.

The Master Plan introduces some major innovations in urban management. Its implementation needs a new urban regulation mode through an improved control of urban development processes and city transformations. It involves operational, anticipatory, realistic and flexible urban planning, which entails significant modifications of city planning practices. In this sense, the Master Plan is more than a document for spatial development orientation and is a strategic vision of the city based on the directive principles combining respect for natural balances, economic efficiency, market forces and social equity into a coherent whole.

The Master Plan addresses the growing requirement of the Bangalore Metropolitan Region and advocates institutional and regulatory frameworks to operationalize the city's vision. The Monitoring Unit will ensure that the Master Plan goals are achieved and that the land use zonal regulations are applied in line with the Master Plan vision. The constitution of the Metropolitan Planning Committee in line with the 74th Constitutional Amendment Act and its functions is currently being contemplated. The formation of the Bangalore MPC will ensure that a Regional Development Plan is prepared for the Bangalore Metropolitan Region sharing the vision of the city and its citizens.

Town Planner Member
BDA

Commissioner
BDA

Chairman
BDA