

CiSTUP

A Framework for Achieving Sustainable Urban Mobility

Prof. T. G. SITHARAM

Chairman, Centre for infrastructure, Sustainable Transport and Urban Planning (CiSTUP),
Indian Institute of Science, Bangalore – 560012

Email: sitharam@civil.iisc.ernet.in



Janmarg Ahmedabad, India

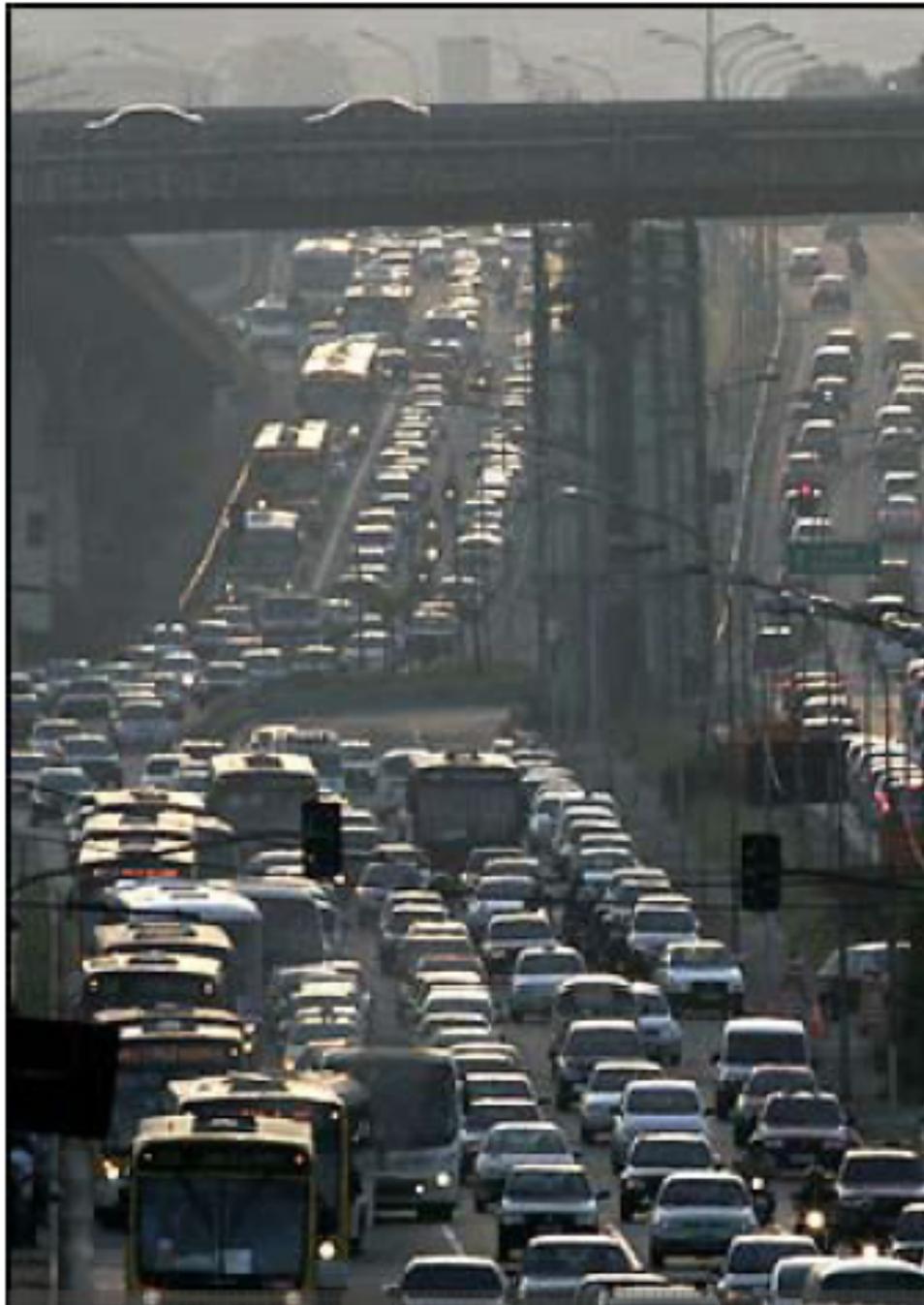
URBAN MOBILITY

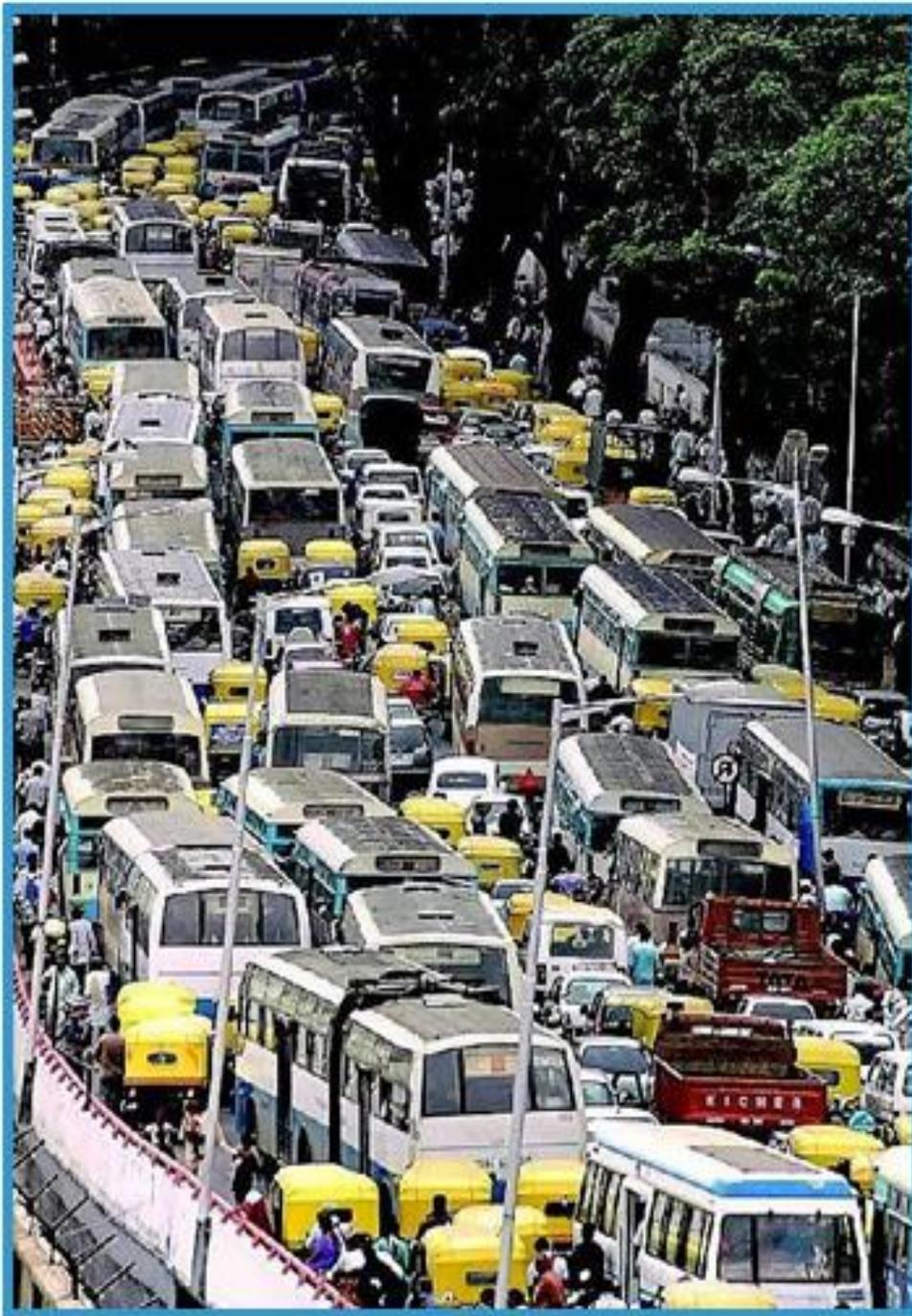
- Traditional transport planning aims to improve **mobility**, especially for vehicles, and may fail to adequately consider wider impacts.
- The real purpose of transport is to **provide access for the citizens** to work, education, friends and family, and goods and services.
- A **sustainable transport system** is one that is accessible, safe, environmentally-friendly, and affordable.
- Cities should improve the sustainability of their **transport networks** to create more vibrant, livable, sustainable cities.

Why Urban Mobility Matters ?

- Citizens expect high levels of mobility.
- Sustainable urban mobility is essential for:
 - Guaranteeing citizens a high quality of accessibility and life
 - Facilitating economic development of cities, thus helping growth and employment
 - Respecting the environment and ensuring sustainable development

Congestion and Motorization – Sao Paulo, Brazil





Bangalore, India

Where's this?

Seoul city invested in public transportation, including creating bus-only lanes and pedestrian bridges, reforming parking policies, etc. Dr. Lee, Seoul embraced a “paradigm shift... from car to human-oriented street.”



Seoul, South Korea the Cheonggye Cheong Expressway

- Centre of the CBD carrying 168,000 cars a day

- Replaced by public park and one way streets on either side and a BRT (Improved bus service)



Sao paulo

Growth of the Urban Population

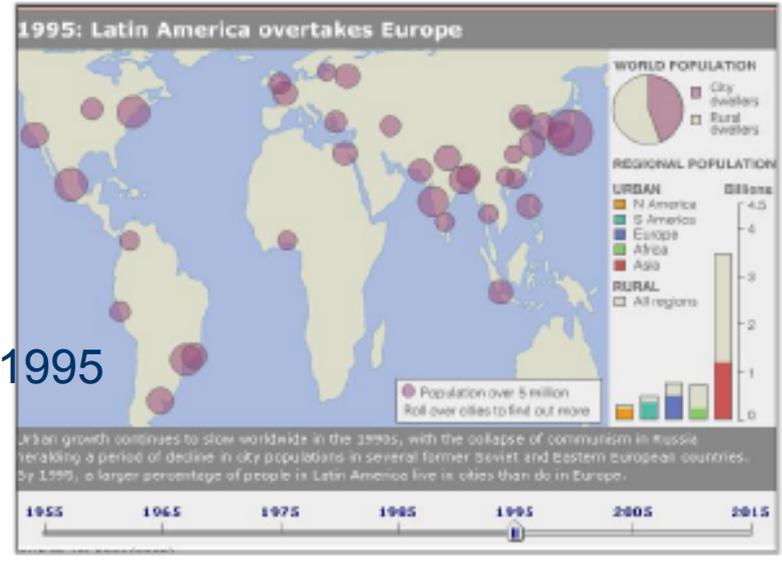
- The United Nations projected that more than half of the world's population would live in urban areas at the end of 2015
- Urbanization will be mainly in less developed regions of the world; Very slow in the more developed regions
- With an estimated population of 1.2 billion, India's urban population is growing at >30%

More Mega Cities

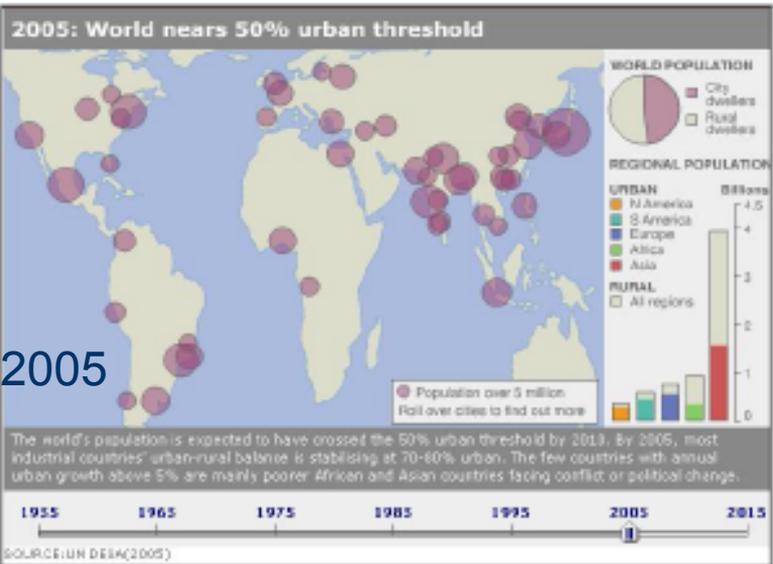
MegaCities Mean Huge Infrastructure and transport problems



1955



1995



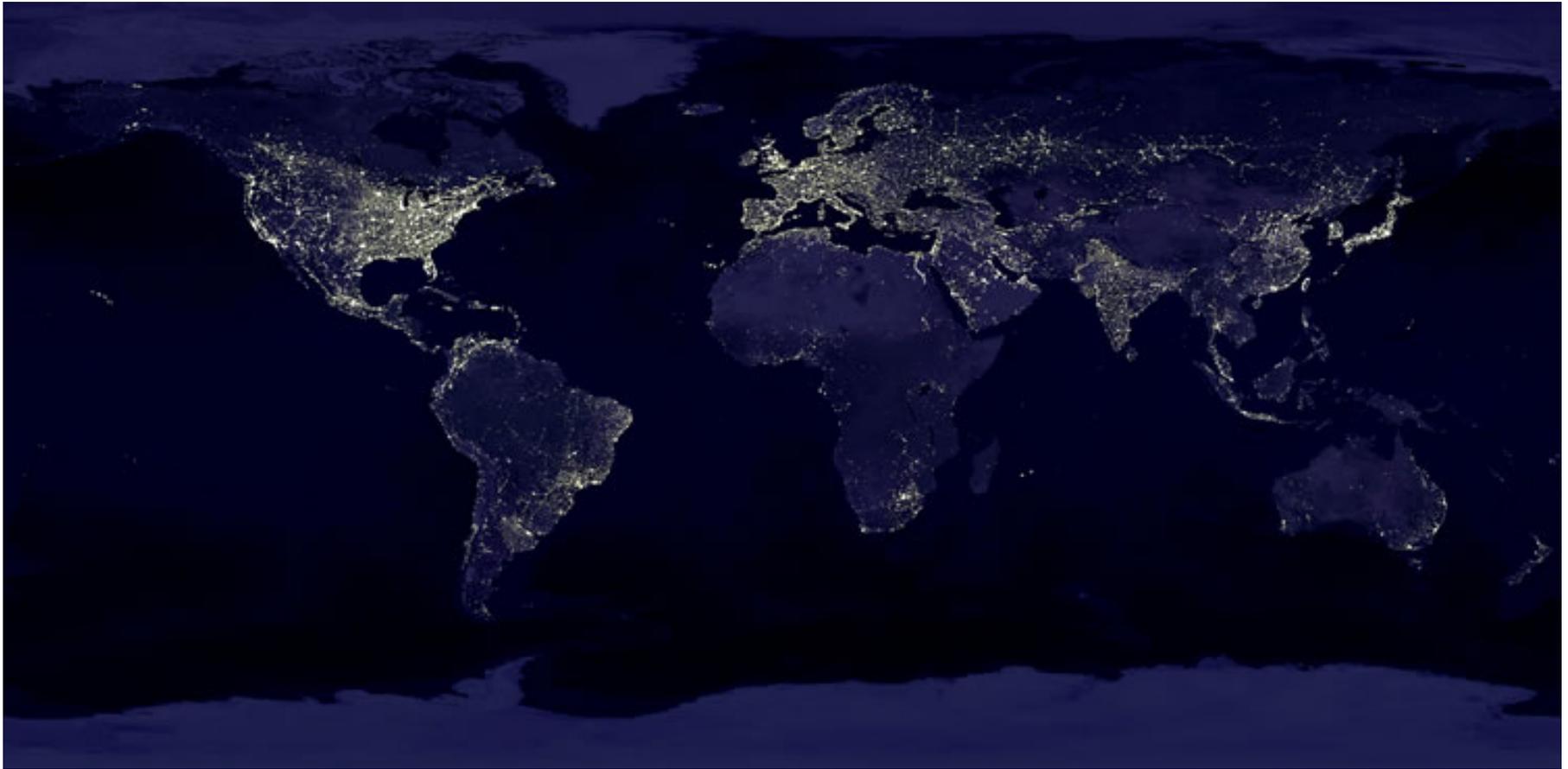
2005



2015

Figure 1 - Here the growth of the urban regions over half a century is depicted.

GROWTH OF URBAN REGIONS IN THE LAST HALF CENTURY



This map shows the geographic distribution of cities. It clearly shows that cities are concentrated in Europe, the eastern United States, Japan, China and India. It is a better map for showing the geography of night time electricity consumption for outdoor lighting than it is for showing the geography of population. For example: the eastern United States is very bright but the more densely populated areas of China and India are not nearly as bright in this image. NASA Image.

How many cities in India? The big picture

- ✓ About a quarter of India's population is urban
- ✓ At least **53 Indian cities have over million residents.**
- ✓ **3 cities have > 10 million residents**
- ✓ **5 more cities are becoming Mega cities**
- ✓ **497 cities with > 100000 population**

2011 Census data

Mega Cities Mean Huge Infrastructure and transport problems

Density of population – Mumbai, Kolkata, Chennai, Delhi, Bangalore ,
Hyderabad – higher **density - 10000 people per sq km**

Mass rapid transit system is very essential

INDIA – AUTOMOTIVE INDUSTRY

- Motor vehicles: 12 motor vehicles per 100 persons.
- In Automotive industry, India is one of the largest in the world and one of the fastest growing globally– Sale of cars 25 to 30% increasing every year
- India manufactures over 11 million 2 and 4-wheeled vehicles and exports about 1.5 million every year.
- Tata Motors began selling its cheapest car "one-lakh car" in March, 2009– will increase the car ownership- thought the Nano would expand the nation's car market by 65%
- In 2009, more than 2.6 million cars were sold in India (an increase of 26%),

Number of cars sold : 2300s t (1975)

26,00,000 (2010)

Number of car models: 3 (1975) 50+ (in 2011)

Price of Petrol: Rs 3.39 per liter (1975)

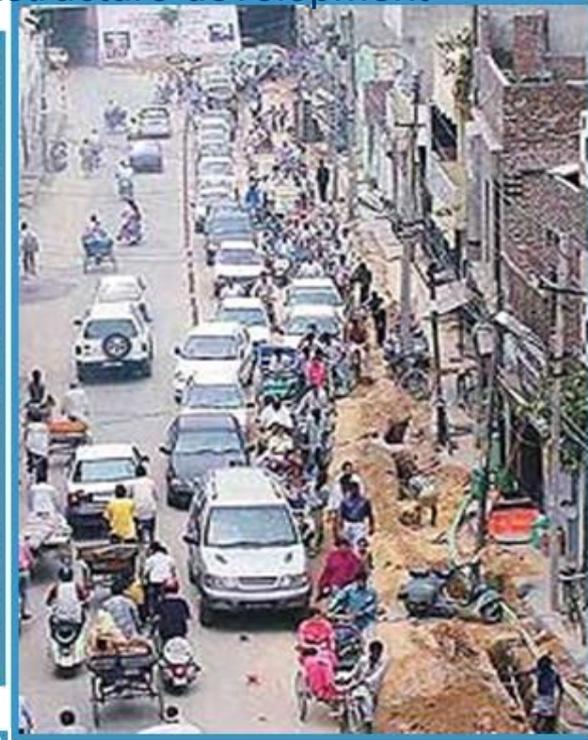
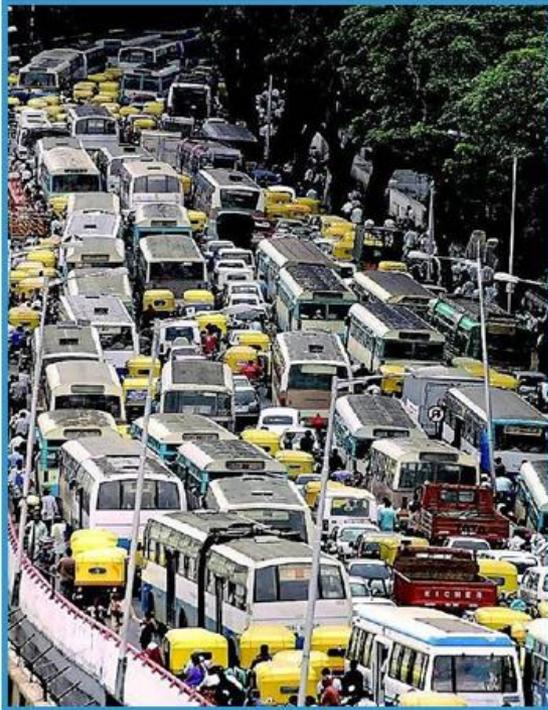
Rs 65 per liter (2011)

CHALLENGES FACED BY CITIES

- **Congestion**
 - Increase of traffic in urban areas is causing congestion - this costs to citizens and businesses
 - Parking – Major problem – Portion of road is occupied by Parking
- **Energy consumption**
 - Urban mobility - faced by the domination of oil as a transport fuel.
- **Climate change**
 - Urban mobility accounts for 40% of all CO₂ emissions of road transport.
- **Health issues**
 - towns and cities face increasing air pollution and noise problems, which impact on citizens health.
- **Safety and security**
 - road fatalities take place in urban areas - pedestrians and cyclists are the most vulnerable victims.

Impact of Global Economic Change

Urbanization, More cars & other vehicles, pollution, congestion, infrastructure development



Problems of Transport

Road Congestion



parking



Accidents



Increasing Traffic intensity



Other Urban Issues





Total Emission Load Tonnes Per Day (source apportionment study for Bangalore, 2007)

	PM ₁₀	NO _x	SO ₂
Traffic			
Road			
Diesel			
DG			
Industry			
Household			
Commercial			
Total			

MEGACITIES

1. POPULATION INCREASE
2. GROWTH
3. TRAFFIC DEMAND
4. POLLUTION

Cities are locations having a high level of **accumulation** and **concentration** of economic activities and are complex spatial structures that are supported by transport systems.

Urban Mobility and its Evolution

- Collective Transportation (public transit)
- Individual Transportation
- Freight Transportation.

Urban mobility accounts for 40% of all CO2 emissions of road transport and up to 70% of other pollutants from transport.

Framework for Achieving Sustainable Urban Transport

● Planning

- Vision for a livable city and city master plan
 - Land use planning
 - Transport master plan

● Design Integrated Transport Systems

- Public transport – commuter rail, metro rail, mono rail, commuter rail, city buses, taxis, autos
- Intermodal Transportation Hubs to connect different modes
- Promotion of Walking and cycling
- Private vehicles
- Trucks and freight movement

● Analyses

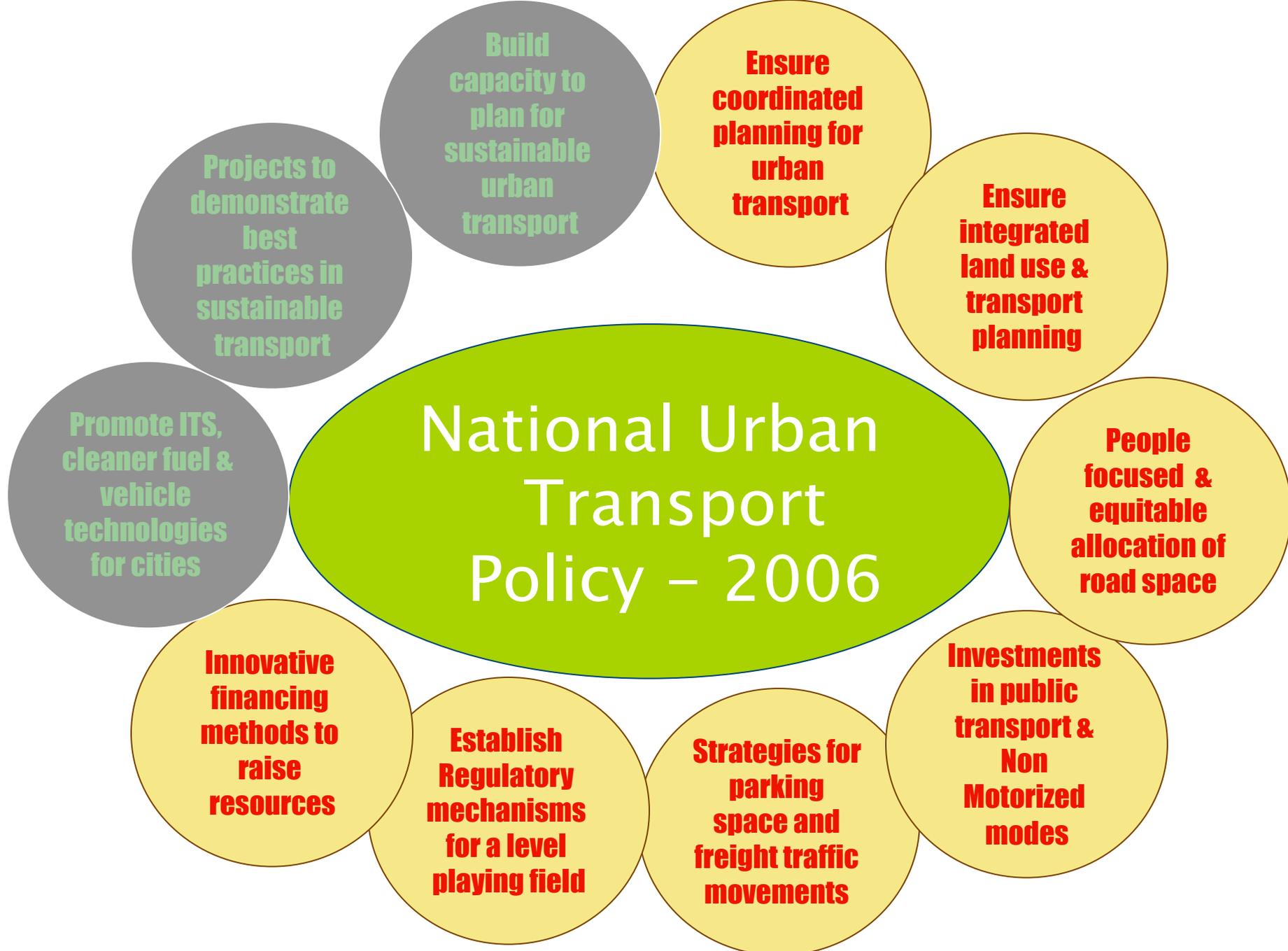
- Political
- Economic
- Social
- Technical
- Environmental

● Implementation and Monitoring

- Technical support
- Stakeholder involvement
- Institutional setup
- Capacity
- Policies
- Financing

Urban Mobility in India - Needs

- **Increase average speed of public transport buses – Bus priority Lanes, Direction oriented services and BRT systems**
- **Transit planning / transportation hubs**
- **NMT policy and cycling routes (intermodal connectivity)**
- **Additional parking and development of parking policy**
- **Use of railways to move large section of urban population – Metro rail, mono rail and commuter rail services to suburban areas**
- **Use of ITS to optimize the services and occupancy of vehicles**
- **Strategies to handle Traffic chaos of heterogeneous mix of bullock carts to Volvo buses**
- **Need for integrated study for city' s traffic and transportation needs - Creation of Traffic Engineering Cell to collect necessary data**
- **Increase awareness about Safety on roads to common public**
- **Improvement of side walks - Integrating Hawkers and Vendors who have occupied the side walks**
- **Trees on Roads / pavements –for better visibility and mobility ??**
- **Driver education, safety and awareness programmes**



NEW CULTURE FOR URBAN MOBILITY

● SMARTER URBAN TRANSPORT

- Cyber communication, computation and sensing
- Use of Cyber physical Systems in urban transportation system
 - Vehicles embeds electronic components and control systems to improve performance and safety - vehicle centric
- High quality information with space and time along with scenario simulations for better mobility
- Intelligent transport systems and traffic management
- Smart charging/ fare collection

● ACCESSIBLE URBAN TRANSPORT

- Collective transport accessible and affordable for all citizens
- Interconnection of urban and sub-urban networks
- Co-modality: optimization and integration of transport modes

● Better organized freight transport

● SHARED CARS / NMT POLICIES

- Shared taxis/autos
- Optimization of the use of private cars – car sharing/car pools
- Promotion of walking and cycling

● SAFETY AND SECURITY IN URBAN TRANSPORT

- Safer behaviour, infrastructures and vehicles
- Cross-border enforcement of traffic sanctions
- Facing security as a growing threat

● GREENER TOWNS AND CITIES

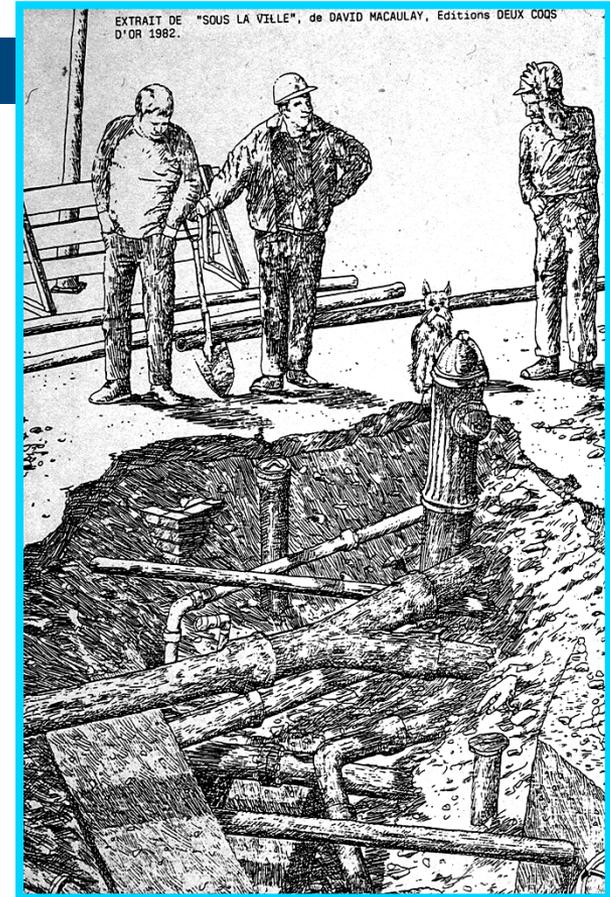
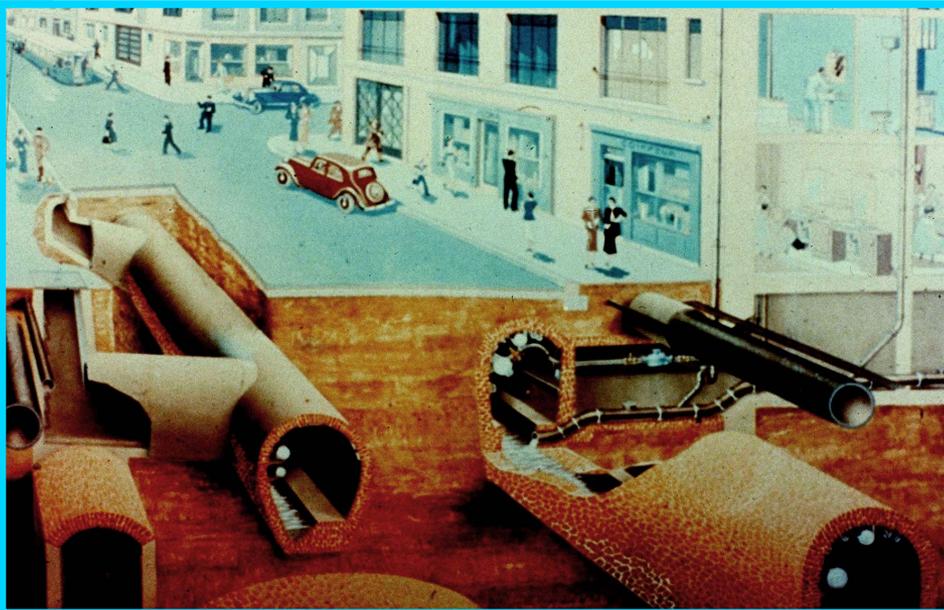
- New technologies to increase energy efficiency - increased use of alternative fuels
- Green procurement
- Traffic restrictions and green zones
- Eco-driving

● A NEW CULTURE FOR URBAN MOBILITY

- ITS Supported by larger sensor networks for sensing, cyber communication data, and information, computation and simulation models for achieving better urban mobility
- Change of behaviour by Education, training and awareness raising

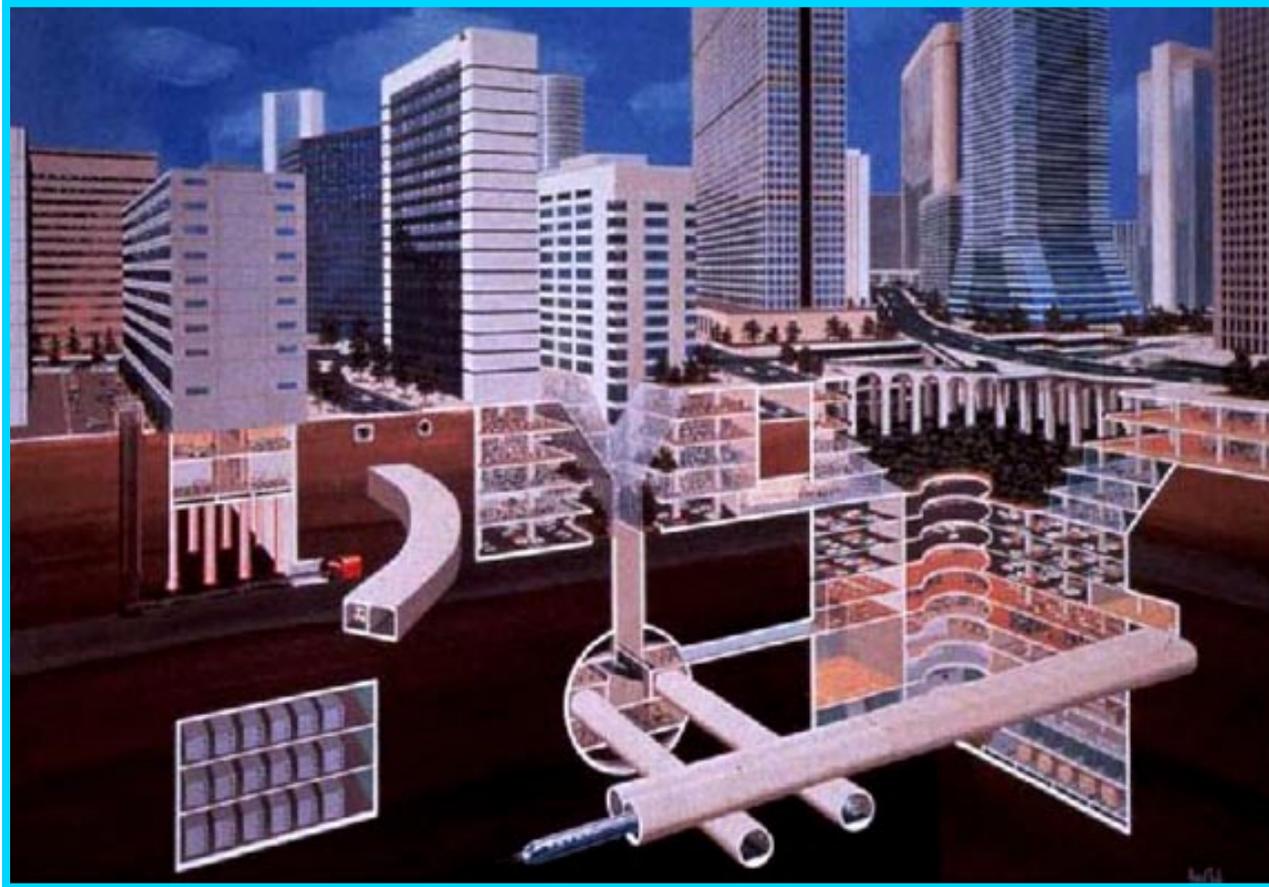
The Relationship between the Urbanization and its Underground Space

Immediate underground level or sub-surface



EVERYTHING IS JUST BELOW THE ROAD !!

The Relationship between the Urbanisation (city) and its Underground Space



Deep level or underground

Benefits of Underground

- Land use and location problems
- Isolation
- Safety – Earthquakes
- Environmental preservation



The Underground is Ideal for:

- Improving the environment
- Supporting Sustainable development

Develop Underground Space in Urban areas

TO PROTECT THE ENVIRONMENT



We need move from Urban Underground Space Use towards
Urban Underground Space Development



BIG DIG , BOSTON



BEFORE



AFTER



The « Central Artery » - Boston - USA

Underground Construction in Urban Areas - Bangalore



Every ring drilled in the Metro tunnel 60 feet below KG -
TOI –Jan 22, 12

Rapid urbanisation – Bangalore Case Study

BRUHAT BANGALORE MAHANAGARA PALIKE
BOUNDARIES OF DELIMITED WARDS (147 Nos.)
AND LEGISLATIVE ASSEMBLY CONSTITUENCIES



**9 million already
live in the city.
An additional
200,000 people
move into the
metropolitan
area each year.**

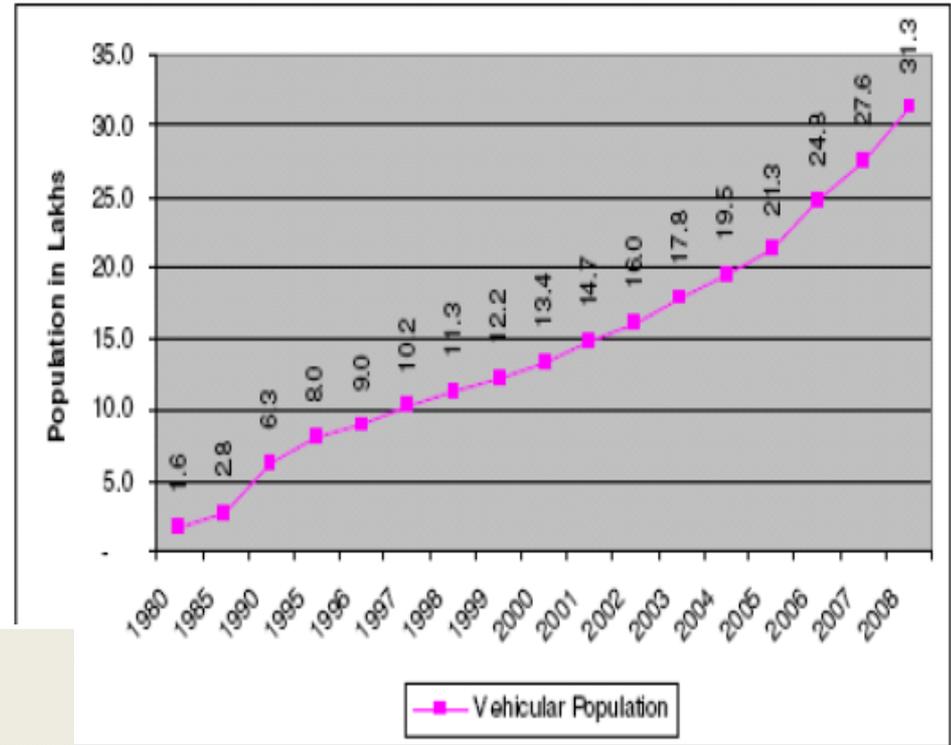
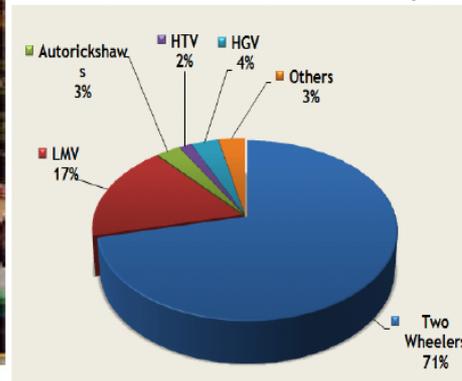
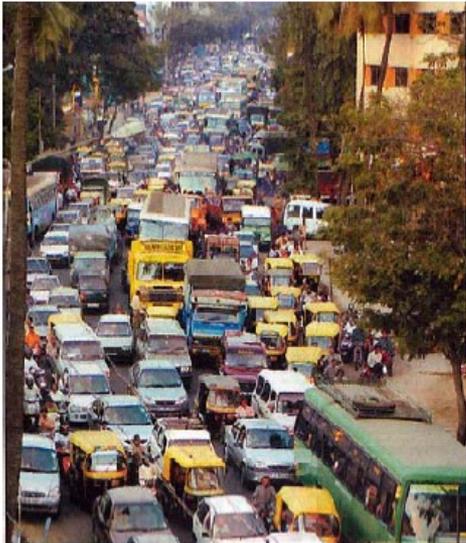
Population will grow rapidly

- Within city population will remain stable.
- Growth mainly in the outskirts.

Region	2011	2021	2031
Within City	5143426	5356491	5356541
Extended BBMP	2710665	4882307	7938274
Rest of BMR	2964564	3647142	4518082
TOTAL	10818655	13885941	17812897

Bangalore: Development of Vehicular Population

- Rapid growth of motorized vehicles.
- Increasing share of mot. vehicles
- Drastic extension of jams will be the result.



Source: Wilbur Smith

TRAVEL CHARACTERISTICS OF COMMUTERS USING 2-WHEELERS

● NEED FOR STUDY

One of the main observations from vehicular growth trends in Bangalore is the tremendous use of 2-wheelers. Between 2005-2008 nearly 7.5 lakh new 2-wheelers were added. As per vehicle registration figures (2008), 2-wheelers account for 71% of the share.

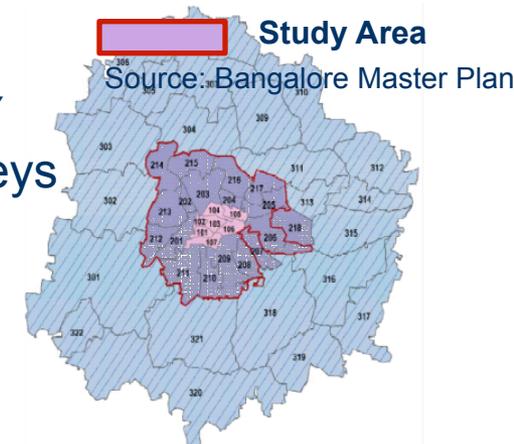
Disadvantages of 2-wheeler Growth	User Advantages
Prone To More Accidents	Personal Freedom & Flexibility
Higher GHG Emissions & Pollution	Door-to-Door Connectivity
Traffic Congestion	Lesser Travel Time
Irregular Traffic & Parking Problems	Economical for Short Distances
	Comfort

□ OBJECTIVE

- To understand the travel patterns of 2-wheeler users, their reasons for not using public transport and evaluate their willingness to shift towards public transport under pre-conditions

□ METHODOLOGY

- Over 1000 surveys completed in different study zones



Study area is divided into 23 zones

Random sampling method adopted
- from each zone the minimum samples about 50

Data collection - COMPLETED

Analysis - UNDER PROGRESS

Actual Average Fuel Consumption (TW, Cars)

Mode	Total	km/Liter	Fuel consumption l/100km
Scooters	35%	35	2,9
Motor Cycles	40%	50	2,0
Mopeds	35%	60	1,7

Cars	Total	km/Liter	Petrol	Diesel	Fuel consumption l/100km
Small Cars	55%	16	35%	20%	6.3
Big Cars	30%	10	20%	10%	10.0
Others	15%	0	50%	100%	12.5

- Fuel consumption of TW is low: If change to car will happen, fuel consumption will increase.
- Fuel consumption for cars and trucks is higher as in Europe due to less restrictive regulations. This will lead to problems in the future, for the car owner as well as for the environment and public budget.

Transportation Systems in Bangalore

- Vehicle Population:
 - 3.89 million as on March 2010

Travel Mode	Share
Walk	34.0%
Bicycle	4.5%
Taxi	0.5%
Auto	4.6%
Maxi Cab	0.5%
TW	21.4%
Car/Van	4.5%
PT	30.0%
Total	100%

Table 8: Shares of different traffic means 2009 (source: Wilbur Smith 2010).



- Number of Auto rickshaw' s - about 100,000
- Radio taxis / cabs
- Car Pool / Car Sharing <http://www.carpooling.in/city/Bangalore>
- (<http://www.commuteeasy.com>)
- Shared Taxis/ Autos

- **BMTC** : → One of the few public sector undertakings (public transport) which is making profits
 - Buses : 7000 Routes operated : 6000
 - Total Trip Lengths : 13 Lakh km
 - Total Trips : 80,000
 - Passengers carried : **4.2 million passengers/day**.
 - 583 city and 1785 sub urban routes, running 13 lakhs kilometers and making 76266 trips
- **Metro Rail**: about 8 km is in operation
 - 42 Kms under construction at the cost of Rs 11000 Crores.
 - Estimated passengers per day: 16.1 lakh (2021)
- Mono Rail: Feasibility study - 54.2 Kms
- Commuter rail: Under discussion with Indian railways

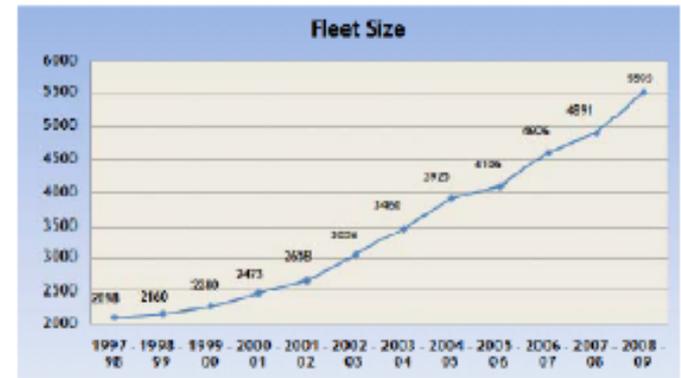


Figure 24: bus fleet development of BRTC

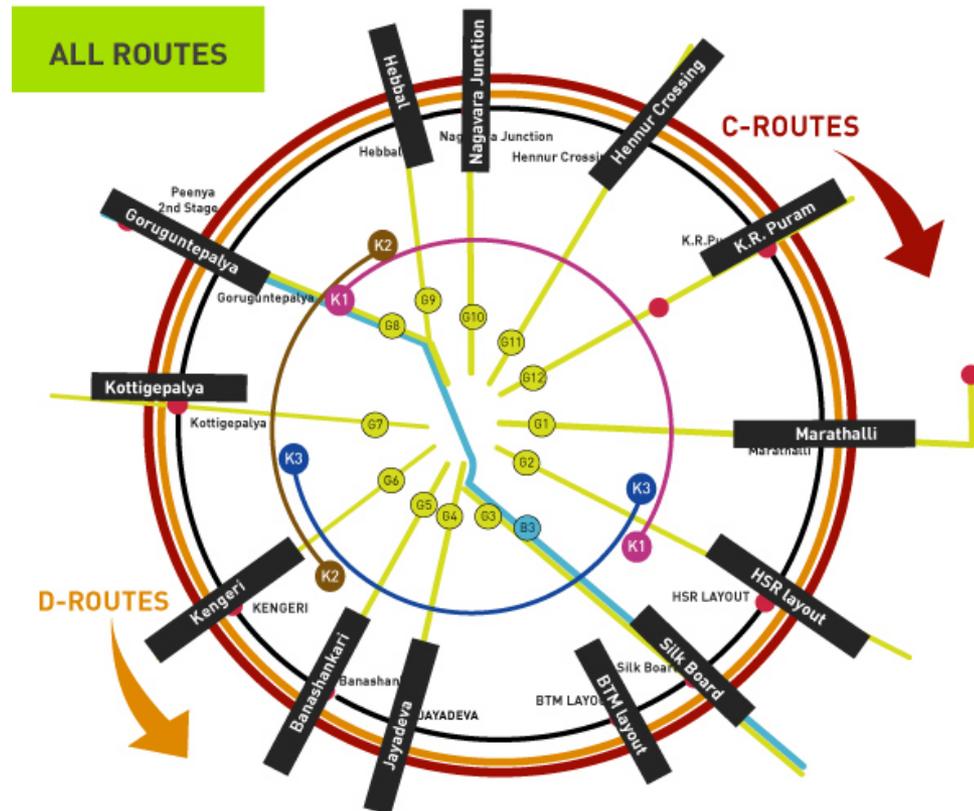
Facilities at BMTC's T T M Cs

- **Bus terminal**
 - Bus bays
 - Platforms
 - Seating & lighting
 - Public conveniences
 - Information systems
 - Safety and security
- **Bus maintenance depot**
 - Maintenance bays,
 - washing platform
 - Bus parking
 - Services and Utilities
 - Fuel filling station
 - Amenities for crew
- **Passenger amenities**
 - Bangalore One centers
 - Other citizen amenity centers
 - ATMs
 - Daily needs shopping
- **Park and Ride facilities**



Direction-based bus services

along with significant fleet expansion



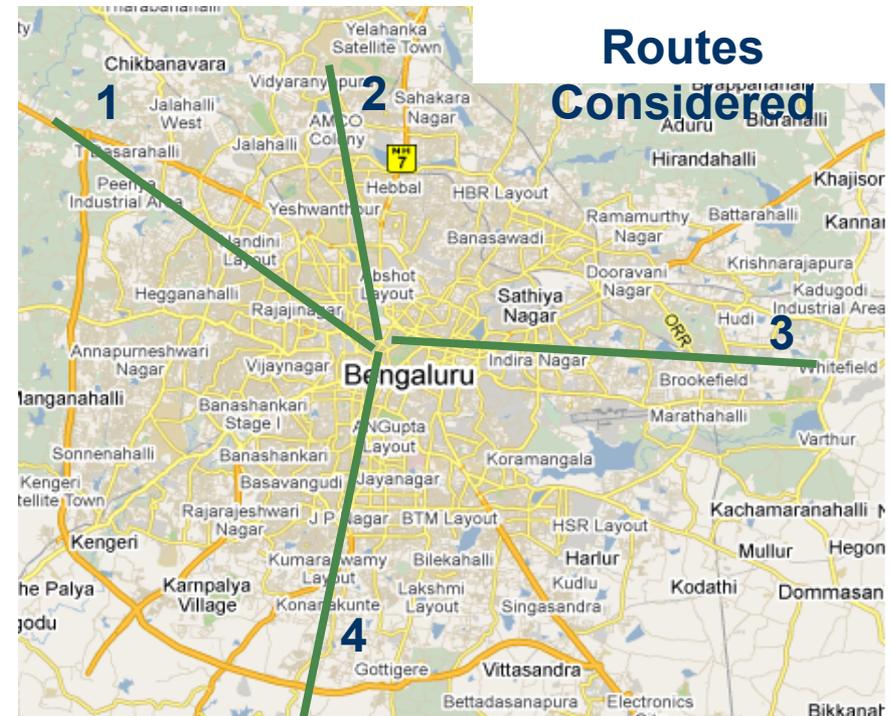
STUDY OF BUS STOPS AND BUS BAYS IN BANGALORE CITY

● OBJECTIVES

- Where are the bus stops?
- What is the present status?
- Integration with para-transit modes
- Appropriateness of location relative to surrounding uses/activity centers/ junctions
- Scientific design

□ Works & Findings

- 6108 buses, traveling 13,04,000 km
- 5886 schedules, 78616 trips
- 4.2M commuters, 3.5 crore daily revenue
- 35 depot, 47 stations
- 583 city routes, 1785 sub-urban routes, over
- > 2300 bus stops, status not known
- Survey of 165 stops carried out, spatially marked, photographs taken
- Not for physically disabled and for 60+





**AIM TO REPLICATE DELHI METRO
EXPERIENCE ON THE URBAN BUSES**

**BRT - URBAN BUS TRANSPORT IS IMPORTANT AND HAS
TO BE TRANSFORMED TO A LEVEL THAT IT CAN BE
SOLD TO PUBLIC AS A “BRANDED PRODUCT”**

- Hebbal to Bannerghatta Road along eastern crescent of outer ring road (33.0 km)
- Benniganahalli (ORR) to PRR along old Madras Road (7.0 km)
- From ORR to Hosur Rd along Hi-tech Corridor (8.0 km)
- Hosur Road to Tumkur Road along PRR (western part) (41.0 km)

**BRTS - With dedicated infrastructure along the route,
specialized vehicles, dedicated road width for Buses – Real
time traffic information to public can be delivered**



DELHI METRO

STUDY OF AUTORICKSHAW SERVICE SYSTEM IN BANGALORE

MULTIPLE STAKEHOLDERS – MULTIPLE PERSPECTIVES !

- **NEED FOR STUDY**

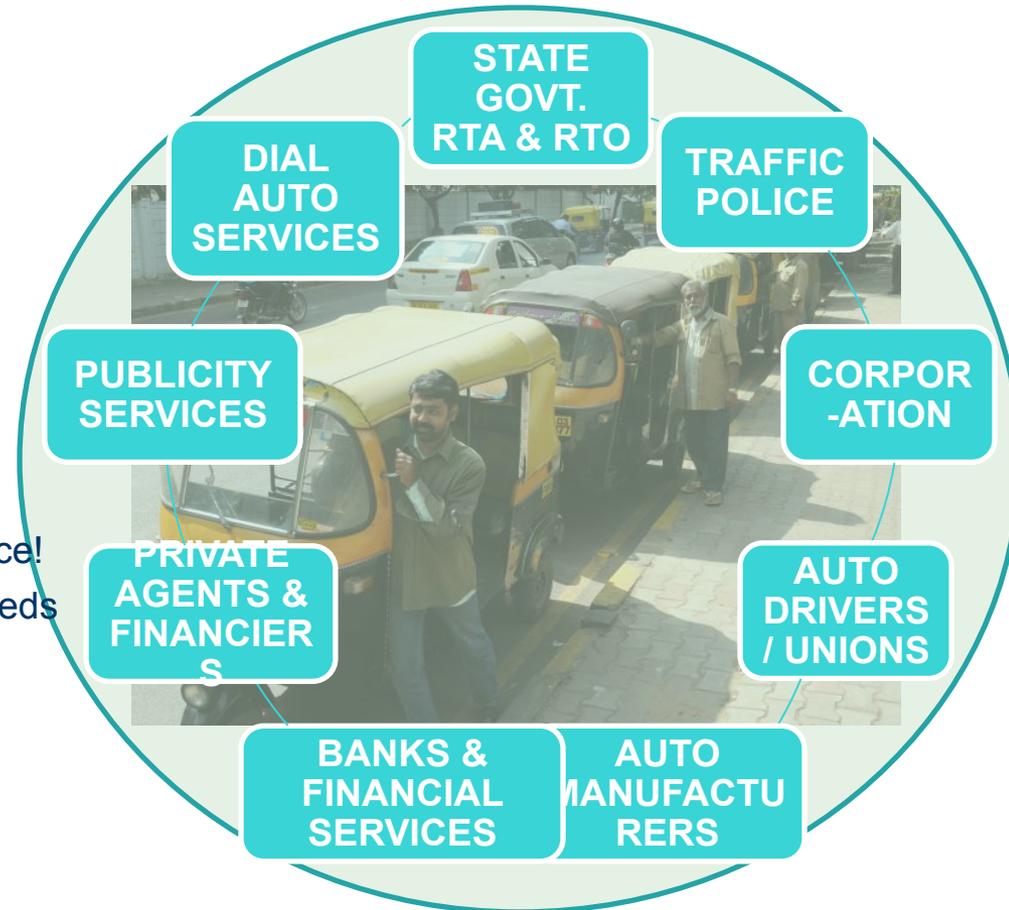
PARA-TRANSIT SYSTEMS

Autos and Taxis; Informal Public Transport – Matadors, Tempos, etc

PRIVATE TRANSPORT

2-wheelers, Cars

Growing public frustration regarding the service!
Integral part of a city's transport system - needs to be streamlined and incorporated!



- **OBJECTIVE**

To assess the system of autorickshaw services in Bangalore, identify key areas/ issues for improvement and put forward some suggestions/

STUDY OF AUTORICKSHAW SERVICE SYSTEM IN BANGALORE

Works & Findings

Primary Surveys, Interviews and consolidation of information from the Literature Review/ Secondary Data, is in progress...

Presented here is not the final analysis or conclusions, but the consolidated findings of information being collected/ collected so far.

AUTO NUMBERS

- Registered and Actual Numbers – number of new autos sold per month in city
- Nature of illegal auto operations
- Regulations regarding green tax and scrapping old vehicles over 15 years old

VEHICLE DESIGN & TECHNOLOGY

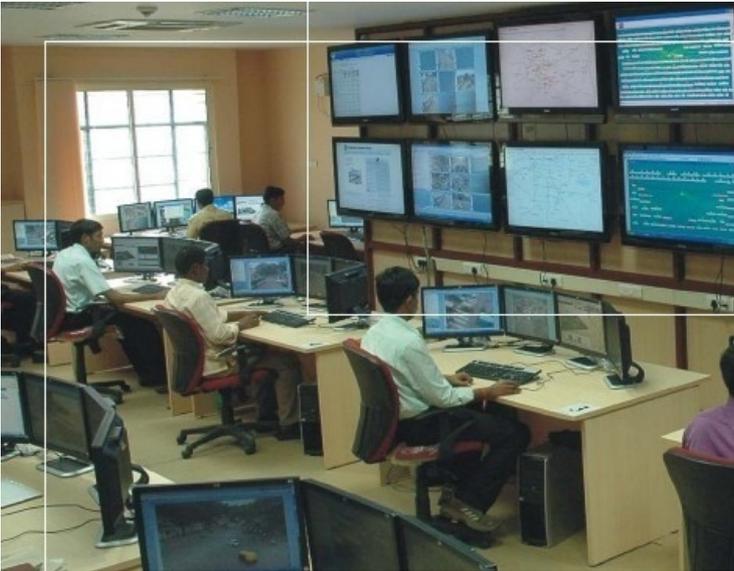
- Regulations regarding vehicle design and technology, environmental and noise pollution, safety norms, etc.

(perceptual figures)

Groups	Responses	Summary/Comments
Auto Drivers	<ul style="list-style-type: none"> Number varies from 0.8 to 2 lakhs In their perception about 30-50% autos are illegal 	<ul style="list-style-type: none"> Responses differ considerably from person to person Many auto drivers think there are enough or more than required autos in the city
Manufacturers	<ul style="list-style-type: none"> About 1 lakh autos, of which 20-25,000 are illegal (25%) 	<ul style="list-style-type: none"> Figures from Transport Dept. GoK Jan 2007 : close to 92,000 autos registered and kept for use
Easy Auto	<ul style="list-style-type: none"> About 3 lakh on Bangalore's roads (!!!) 	

India's first Traffic Management Centre

Bangalore Traffic Improvement Project-B-TRAC 2010



B-TRAC 2010: This 5-year programme will cost about Rs. 350 crores. For the financial year 2007-08, 2008-09 and 2009-10, the Government has released Rs. 44 crores, 35 crores and 40 crores respectively. In the year 2010-11, Rs. 5 crores is planned to be released. The implementation will be done by the Govt. owned Karnataka Road Development Corporation (KRDCL).

Traffic Management Centre in Bangalore



- Traffic management centre
 - 330 signals operational in the city of Bangalore – vehicle actuated signals, direction boards, pedestrian components, disable friendly auditory signals.
 - All of the signals are centrally controlled from traffic management centre (TMC) with IP based network
 - Optimization of timing of signals and pattern
 - Surveillance cameras and enforcement cameras
 - Real time traffic information to public
 - Parking information system
- Traffic helpline
- A High end software application ‘Traffic Silverlight’ provides sophisticated GUI for monitoring and managing signals .
- Signal timings can be changed from the Traffic Management Centre as and when desired.
- Virtual loops with the help of CCTV cameras are also used for traffic control and monitoring.
- Moving enforcement /Surveillance



Emergency service

Figure 2: Pictorial representation of GVK EMRI's Communication technology

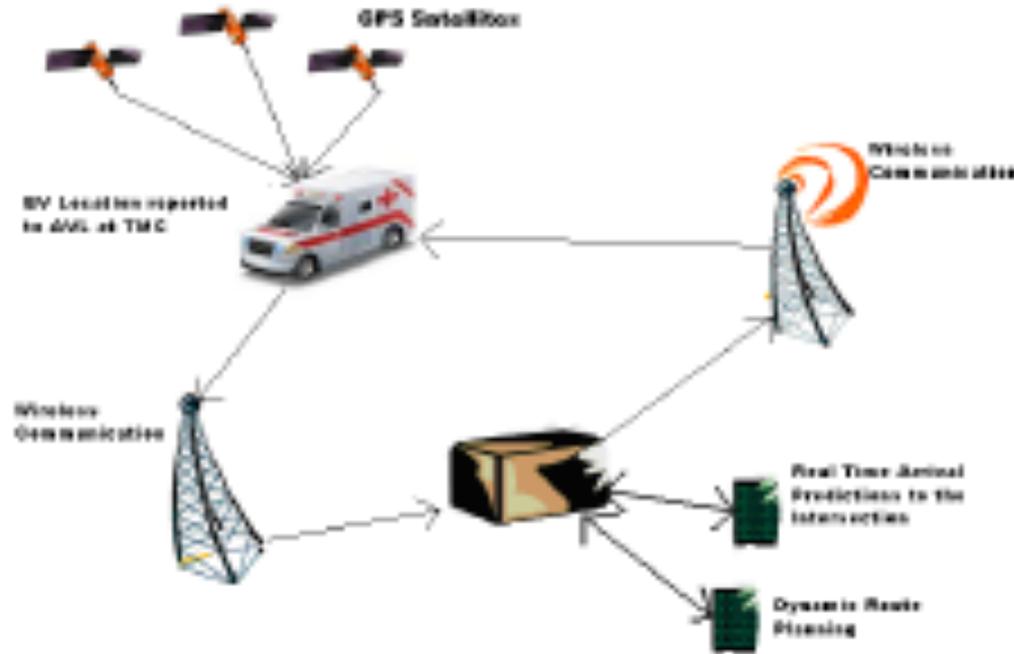
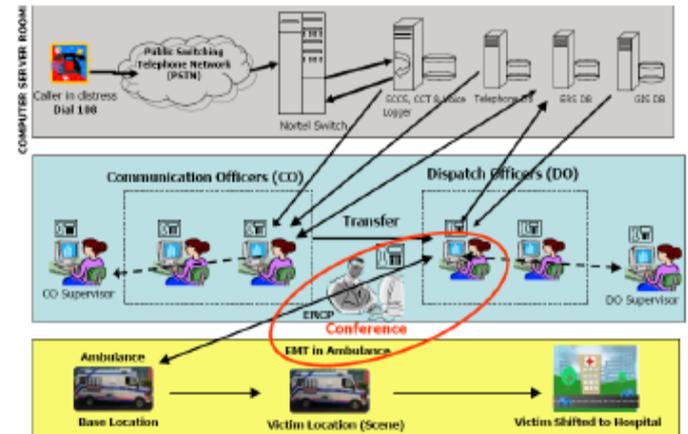


Figure 3: GVK EMRI's flow chart processes



*CCT-Communication Control toolkit, SCCS-Symposium Call Center Server, ERCP-Emergency Response Center Physician, EMT Source: Rammohan's Blog "Technology behind EMRI" *

- GVK EMRI handles medical, police and fire emergencies through the " 1-0-8 Emergency service".

- This is a free service delivered through state-of-art emergency call response centres and has over 2858 ambulances

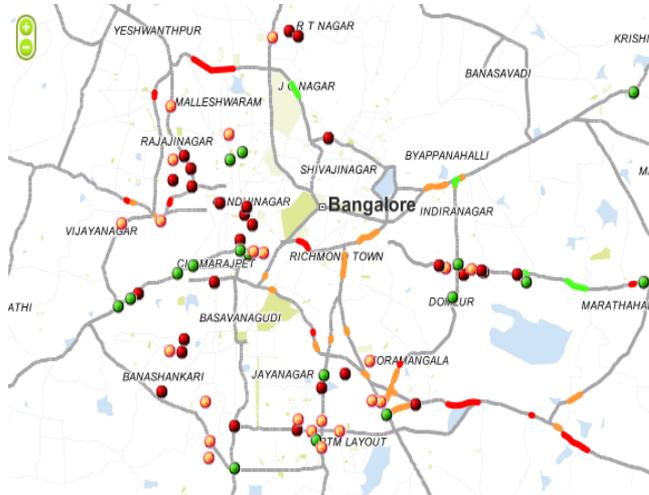
- across Andhra Pradesh, Gujarat, Uttarakhand, Goa, Tamil Nadu, Karnataka, Assam, Meghalaya, Madhya Pradesh, Himachal Pradesh and Chhattisgarh.

Opportunities for Emergency Vehicle Preemption in Bangalore: A case study

Dileep Kadambi¹, Deepak Baidur^{2*} and T. G. Sitharam³

A system that can allow the clearing of an intersection for Emergency Vehicles (EVs) to pass and to give right of way to an EV through an automated system integrating the Intelligent Transportation System (ITS) with the EV operations.

Bangalore Transport Information System



[http:// www.btis.info](http://www.btis.info)

TRAFFIC · DIRECTIONS · BUSES · FINES
 · RTO · AIRPORT · PUBLIC OFFICES ·
 SAFETY · PARKING · TOURISM · METRO
 CARPOOL · INDIBUS TRACK YOUR FLEET



btis SITEMAP · ABOUT · MAPID · PERSONALISE · CITY ↓

BANGALORE TRANSPORT INFORMATION SYSTEM

SITEMAP

LIVE TRAFFIC
Get your keys. Check BTIS. Go.

- Traffic Status
- Traffic Cameras
- Safety
- Traffic Fines
- Vehicle Information (RTO)

MOBILE
Plan your day. All on your finger tips. Be on the move.

- Traffic & Directions
- Traffic Fines
- Vehicle Information (RTO)
- Mobile Application
- 3G

PUBLIC OFFICES
Want to know where the nearest Traffic Police station is or the nearest RTO or the Bangalore Once Centre.

- Traffic Police Stations
- RTO
- Bangalore One

PUBLIC TRANSPORT
Taking buses was never this easy. Hop in and hop out.

- Search buses
- View Route
- Track all Buses
- Direction bases services
- Airport Shuttles

CARPPOOL
Save fuel. Make friends. Unclutter the road. Share and drive.

- Find Partners
- Join Carpool
- Edit your profile

TRAVEL AND TOURISM
Tourist attractions, Intercity travel.

- Tourism in Bangalore
- Intercity Travel

WRITE TO US
Be it a comment, a bug that you just found or a new idea that would improve the transport.

- Feedback
- Bug Report
- New Idea
- Report BMTCTicketing issues

PERSONALISE
Locate your home or office on the city map with MapID feature, Interested in a specific locality in the city, personalise BTIS to your locality of interest

- MapID
- My BTIS

TRAFFIC

TRAFFIC DELAYS

LIVE CAMERAS

ST JOHNS RD COLES PARK RD JN
ULSOOR

LIVE CAMERA HISTORY DENSITY

BTIS.IN 23/02/2011 15:12:01

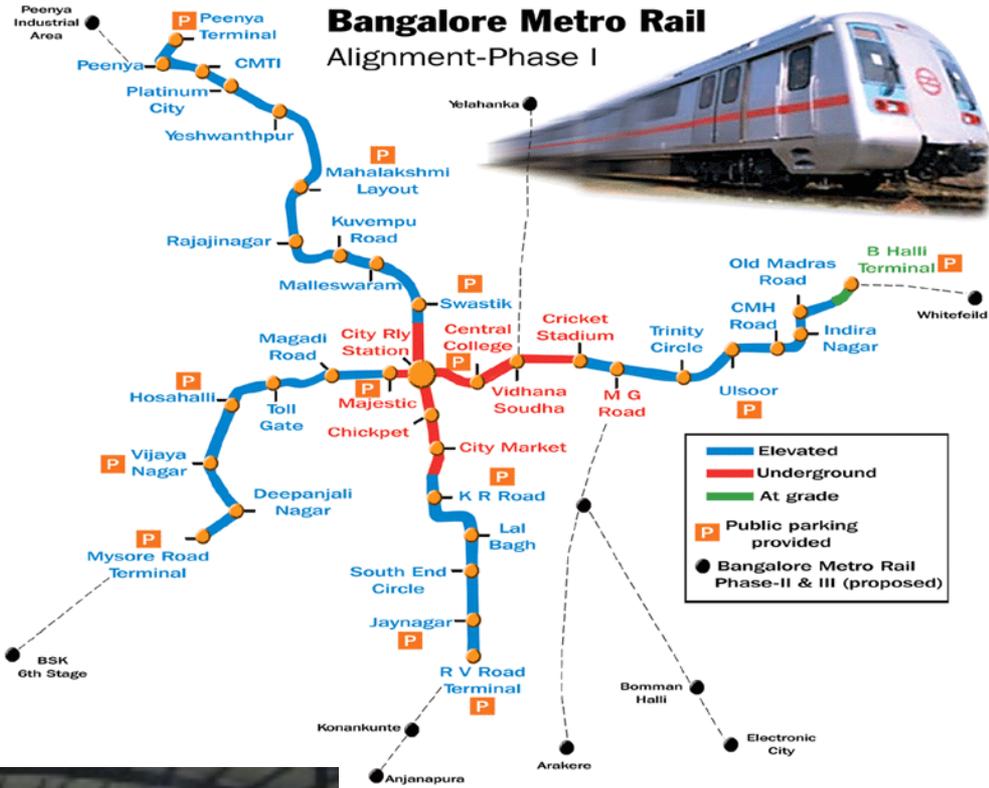
CHANGE LOCATION

Dr. Ashwin Mahesh –
 CiSTUP fellow



Bangalore Metro

- I Phase (2 corridors double lines) covers ~42.30 km
- N-S corridor will be 24.2 km
- The E-W corridor will be 18.10 km.
- Of the 42.3 km, 8.82 km will be **Underground** near City Centre & Railway Station and the rest will be elevated

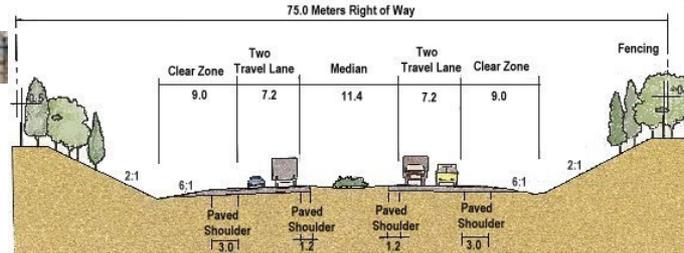


Roads / Flyovers in Bangalore



The **Bangalore Elevated Tollway** is a 9.985 kilometers (6.204 mi) long elevated, tolled, access-controlled expressway outside Central Silk Board at the Junction of Hosur Road with Outer Ring Road

Bangalore - Mysore
INFRASTRUCTURE CORRIDOR



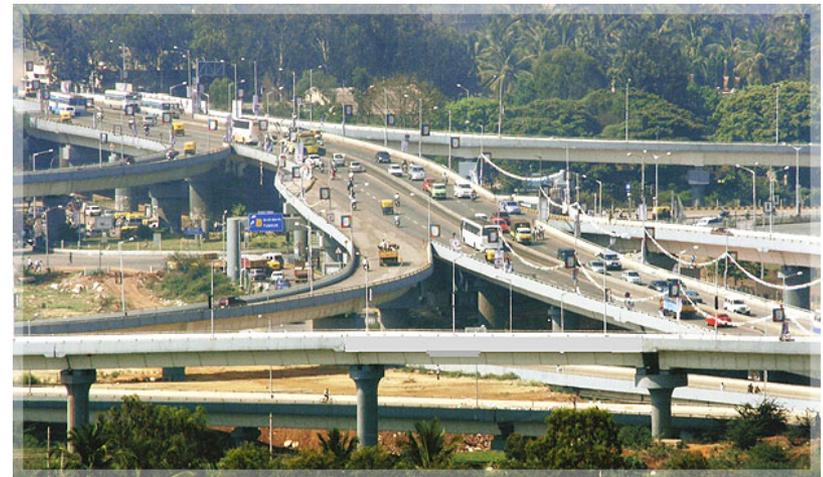
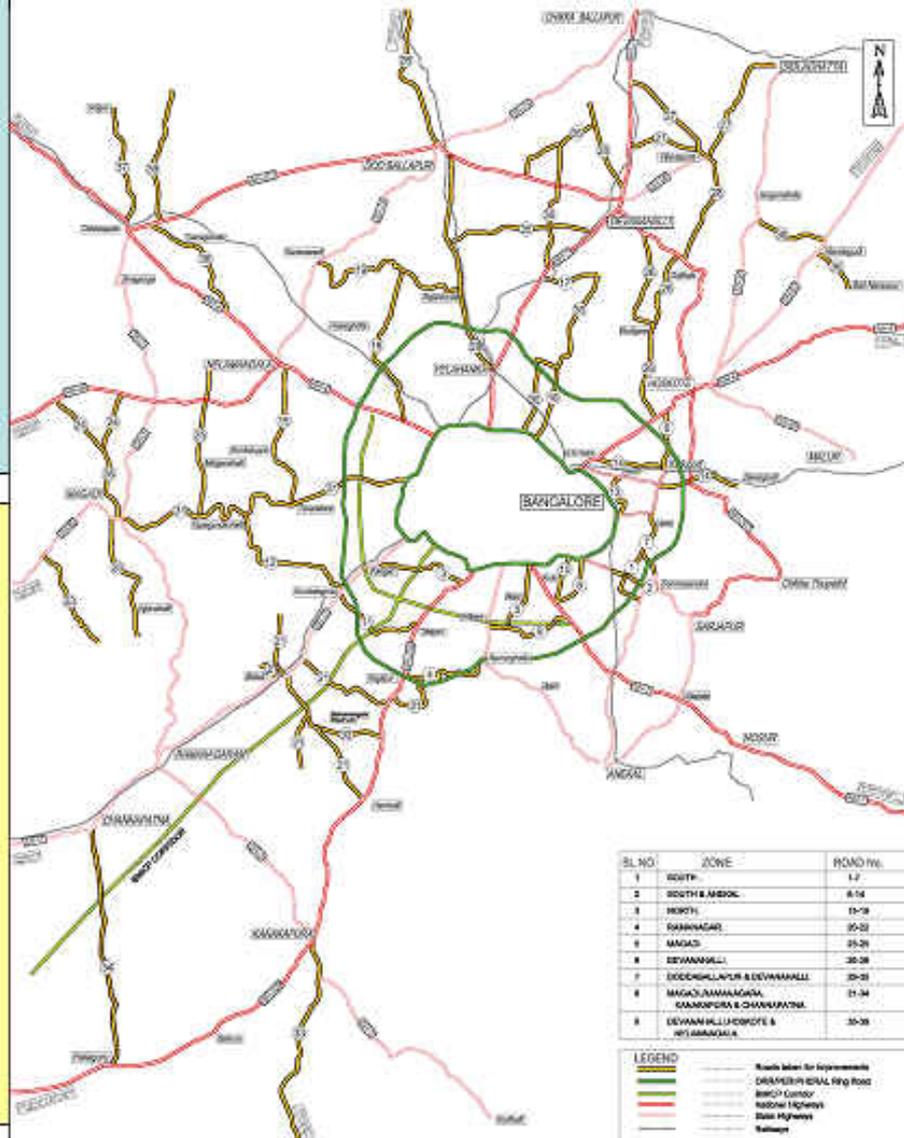
Bangalore – Mysore Infrastructure Corridor (BMIC) also called **NICE road** is a 4 to 6 lane private tolled expressway



The **Bangalore-Nelamangala** expressway 19.5 km stretch, 4.3 km is fourlane elevated highway

Elevated road to BIA in the making





Major road widening project around Bangalore - executed by the state PWD with a cost of about Rs 684 crores.

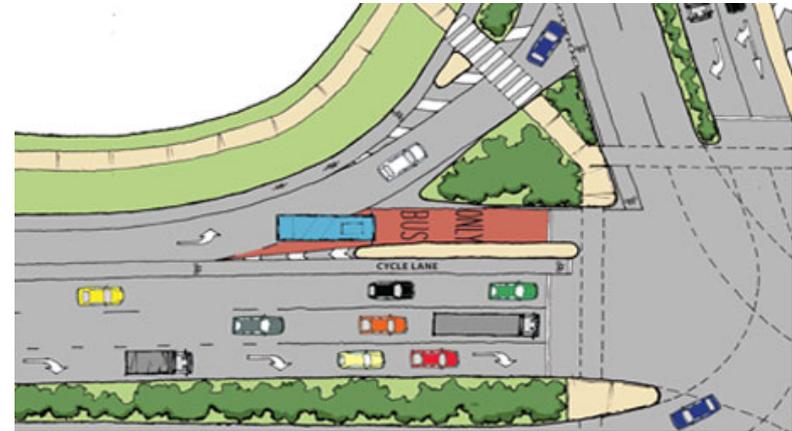
- a total of 39 key roads (884 kms) were widened.

ROAD NETWORK IN AND AROUND BANGALORE

BUS PRIORITY SYSTEM – Pilot Project

Many cities have developed variations around the general approach of **Bus Rapid Transport (BRT)**.

The concept of a **Bus Priority System (BPS)** is a collection of some (not all) of the practices from BRT to result in improved bus services and better performance.



Objective

- A pilot study for BPS on Old Madras Road

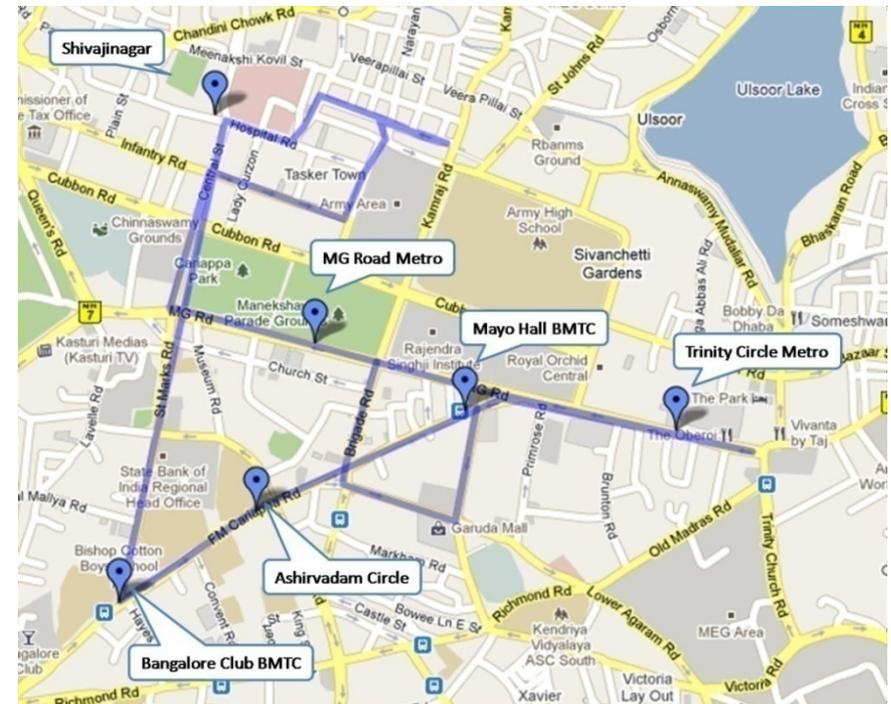


Dedicated bus lanes to be tested on old Airport Road

NMT PLAN - CBD BICYCLE SHARING SCHEME, BANGALORE

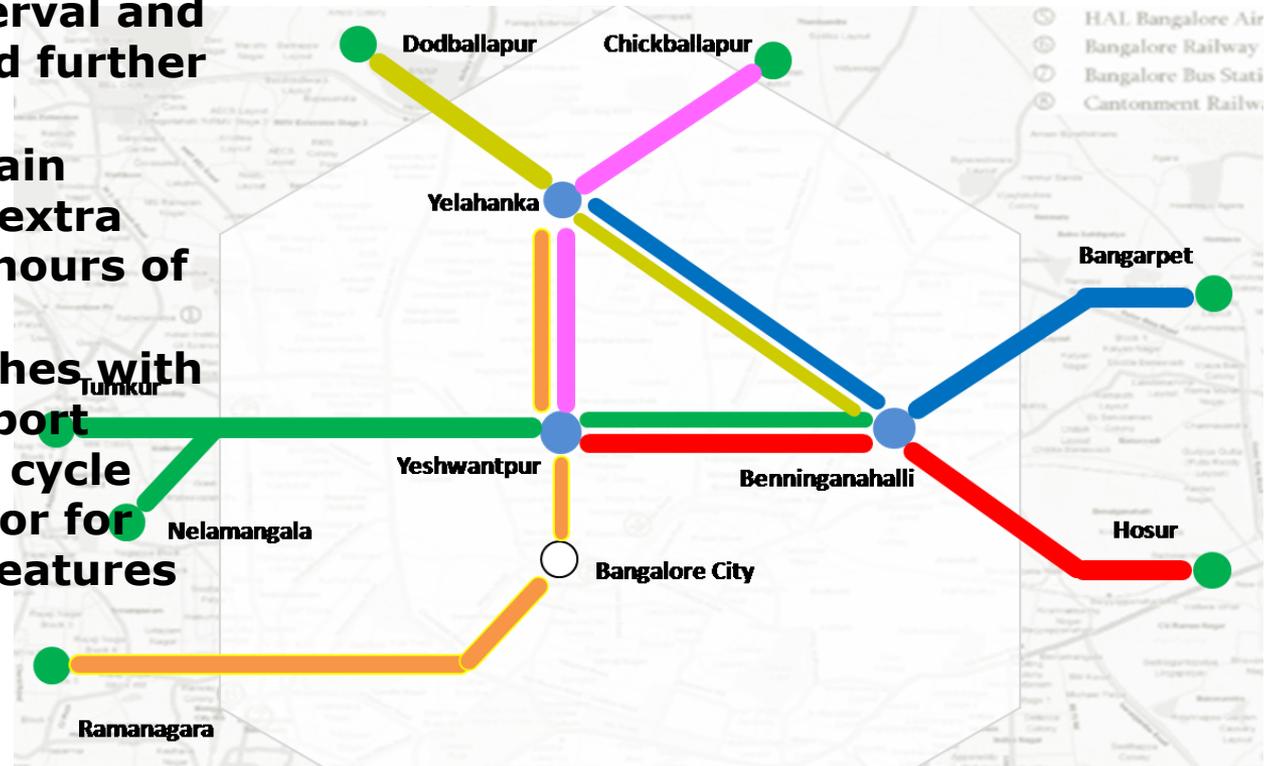
Project Features:

- Creation of the brand for the system which will lead to uniform expansion
- Working out details of cycle and station design to balance cost, durability and user friendliness
- Determining the operational details, maintenance and redistribution processes
- Designing, deploying and field-testing the technology required for system
- Rental process - mobile technology can aid these efforts



Namma Railu – Bangalore Commuter rail system

- Branded uniquely identifiable trains & service
- Connects major towns approximately an hour commute away to the nearest hub in the city
- Lower frequency than a metro, following a schedule rather than fixed interval and fewer stations spaced further apart
- Running speed of Train about 50 Km/h with extra services in the peak hours of morning, evening.
- Dedicated EMU Coaches with non-motorized transport friendly features like cycle carriages and low floor for disabled and safety features like closable doors



An effort towards improved mobility in Bangalore

- Road Design **Ducting utilities on 14 arterial roads**
- Footpath Budget in BBMP **A dedicated budget for footpaths**
- **Metro Zone** **Metro-Zone footpaths – 30km this year**
- **Commuter Rail** - CiSTUP and Praja
- **Transport Policy** - CiSTUP
- **Junction improvements** – BBMP and PPP projects
- **Non-motorised transport** – DULT
- **Electric car**



18th October 2011 at three locations in the CBD (Central Business District)

Junction redesign



Figure 22: REVA electric car

SOLUTION TO TRAFFIC PROBLEM

- **Improved Mobility of 'People' rather than 'Automobiles' should be the principle to reduce the traffic problem in the city**
- **“Excellent Public transport is the only the solution for decongesting the traffic in cities. Thus the goal shall be to increase the modal share of public transport system to 70% or double it by 2020”**

SUSTAINABLE Urban Transport

- Walking and biking
- Public transport –
 - rail and road based
- Transit oriented development
- Demand management
- Safety
- Environmental friendly –
 - alternative fuels,
 - hybrid vehicles, etc



CiSTUP

Center for Infrastructure, Sustainable Transport and
Urban Planning, Indian Institute of Science, Bangalore, INDIA



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