Lakh ko 50 Bus Campaign

Development by Bus: Urban Development and Bus-based Public Transport

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Foreword

In this second year of our "Lakh ko 50" campaign which seeks to raise the pitch for bus-based public transport in cities we used a thematic approach to explore the deeper connection between city bus services and "gender", "urban development" and "environment". This has been richly rewarding since many aspects of how the simple bus service depends upon and in turn influences the sector has emerged from the numerous discussions that we held with sector experts. We have experientially known the enormous impact that transport has on urban development and in turn we have also seen the impact that instruments such as the development plan have on transport in general and the ability of the city to provide quality bus services to its people as it grows - in physical, demographic and economic dimensions - in particular. Some connections are obvious, such as the allocation and availability of land for bus depots and terminals, which bus service providers have said time and again is crucial to ensure quality of service and to reduce cost of service. How those depots and terminals get developed, the location of the lands and how to plan bus services for an ever-expanding city, were some of the nuanced inputs we received from practitioners in the field.

Heritage, its protection, enhancement and the recognition of its place and role in making our cities livable and aesthetically pleasing, has always been an area of interest for Parisar. The increasing conflict between the "development" priorities of the city and heritage buildings, traditional markets and core city areas where one often finds these city-defining features has been an area of concern. Misplaced reliance on building more roads to "solve" traffic problems has often come at the expense of our cities' most valued possessions. Yet, world class cities are defined by their heritage and its accessibility to people. Reduction of motorization has emerged as a global theme when it comes to heritage conservation, something that is possible only when the city has a top notch bus service.

Keeping in mind that Maharashtra is a highly urbanized State with 27 Municipal Corporations (the most in any State in India) and given the contribution by the cities to the State's economy, the Urban Development Department of the Government of Maharashtra plays a vital role in recognizing these connections and taking steps to ensure that all cities have robust and sustainable bus-based public transport.

This report summarizes the learnings from those discussions and are included in the recommendations as well as the public statement that over 50 professionals, experts, academicians and organizations have endorsed. We hope that this report is well received and along with the other sectoral reports forms a comprehensive and compelling argument for the State to seriously consider reforms that will make "Lakh ko 50" a reality.

We would like to thank Shivangi for helping to draft the report and Swati in helping to give it its final shape. We would also like to thank all the participants who were part of the conversations that ultimately form the heart of this publication.

Ranjit Gadgil
Program Director, Parisar
May 2022

Executive Summary

Transportation is an important metric for measuring the development of a city. Sustainable transportation, on the other hand, is a crucial metric for measuring the liveability of a city. In either case, transportation in general, and public transportation, in particular, bears a huge impact on the degree and definition of urban development. This degree and definition is also determined by components like urban planning, design, identity, infrastructure and heritage, thereby bringing transportation in a constant dialogue with them.

The Urban Development Department (UDD) at the state level is the key body in shaping, impacting and addressing these metrics, degrees, definitions and dialogues. Given the prevailing urban development paradigm, it's important to put climate action and sustainable transportation at the heart of cities' strategies and policies, and explore the role of bus-based public transport in enabling this.

India's urban population growth has increased urban trips and the consequent travel demand creating an imbalance between travel demand and transport infrastructure supply. However, as this report demonstrates, this relationship need not be unsustainable. The avenues towards a sustainable transport future do exist that revolve around a quality bus-based public transport system in cities. This report highlights a range of such avenues ranging from policies to tools like the Development Plan, from measures like integrated land-use planning to steps like inter-department coordination.

Maharashtra is one of the most urbanized states in India, with more than half of the population living in cities. For an urbanized state like this, the cities have inadequate buses impacting the productivity of the millions dependent on them, and chronic congestion due to increasing number of private vehicles amounting to thousands of crores of loss to the economy. Therefore, restraining vehicle ownership and strengthening public transport are urgently needed to move in the right direction.

A bus-based public transport network shaped around passengers that provides the services that people need, at a price they can afford, as we adapt to new ways of working, living and traveling is crucial to rebuilding the economy and tackling climate change. By placing city buses at the heart of its development strategy, the government can make sure that everyone has access to easy, safe, convenient and affordable journeys.

Expertise on urban governance, development and planning is within the domain of the Urban Development Department but the issue of intra-city bus transportation and planning often takes a backseat. We, therefore, urge the UDD to include the goal of a sustainable, comfortable, well-planned and reliable bus-based public transportation within the agenda of the department. According to this report, the most effective way to do this, is to:

- Provide for a city's requirement of buses by **stipulating specific norms and guidelines for bus-based public transport** within the framework of a city's Development Plan.

- Ensure that the **Comprehensive Mobility Plan** (CMP) of a city which must include the provision of BPPT, is taken into cognizance when the Development Plan is being drafted.

- **Reassess and update existing BPPT-related guidelines** like provision of depots and terminals per lakh population, and ensure their proper implementation.

- Ensure that **Traffic Impact Assessments** are duly carried out for major urban development projects.

- Enable public transport planning ahead of the demand by allowing local area plans to include **peri-urban areas.**

- **Allocate resources** from the State for provision of quality-level bus services, especially in Tier-II and Tier-III cities of Maharashtra.

- Recognise urban transport as a multi-sectoral issue and **work in coordination with allied departments** (transport, environment, finance) to improve bus-based public transport services and champion a state urban bus-based public transport policy that is inclusive of the aforementioned recommendations.

Urban development, planning and transportation

India is one of the fastest-growing economies in the world today. The economic growth rate of 5.5% per annum from 1981 to 2001, accelerated to 7.7% per annum during 2001-02 and further to 8% - 9% per annum GDP growth in 2010-11. Economic growth is driven by and also leads to rapid urbanization. As an economy grows, its towns and urban centers expand in size and volume, and the contribution of the urban sector to the national economy increases. The contribution of the urban sector to India's GDP has increased from 29% in 1950-51 to 47% in 1980-81[1]. The urban sector presently contributes about 62% - 63% of the GDP and this is expected to increase to 75% by 2021.
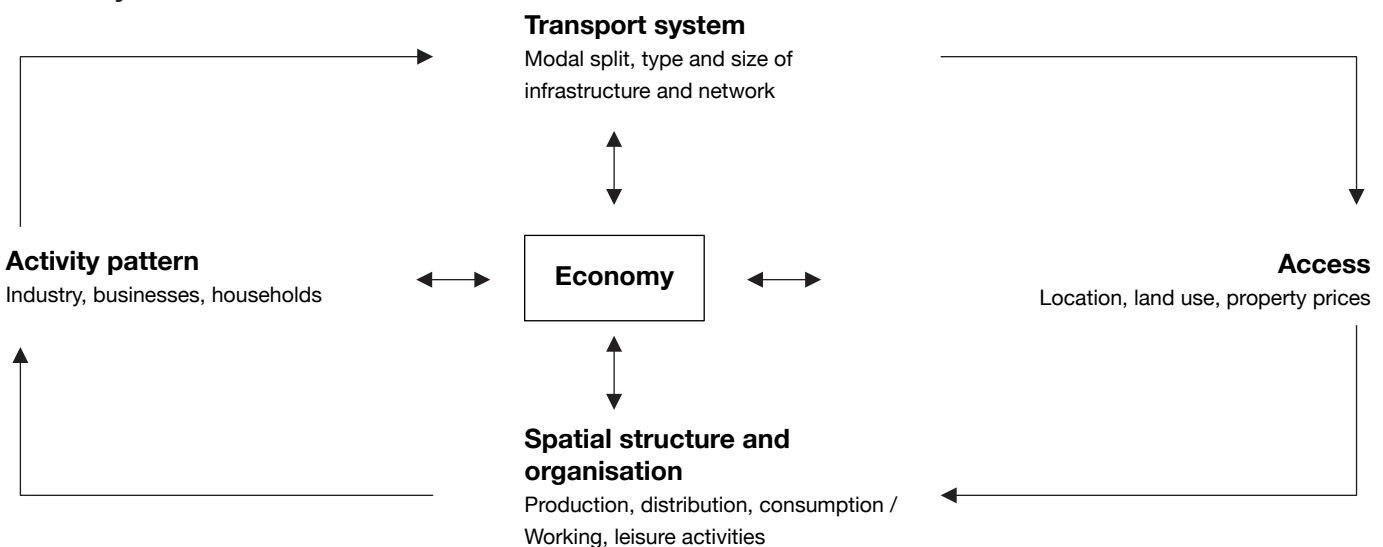
The census data on the rural-urban composition reveals a continuous rise in the rate of urbanization in India and more particularly during the second half of the present 21st century. The percentage of the urban population to the total population of the country stands at 31.16. There has been an increase of 3.35 percentage points in the proportion of the urban population in the country during 2001-2011. The provisional results of Census 2011 reveal that the decadal growth rate of population in urban areas was 31.8%[2]. This change shows us that urban growth in India has been moderate, yet impactful in many ways.

Although India is less urbanized when compared to many countries of Asia, like China (61%), Japan (92%), United Kingdom (84%), and even Pakistan (37%)[3], urbanization has led to pressure on civic infrastructure systems, open green spaces, and transport, which has eventually led to deterioration in the quality of city environments. India's growing economy has also witnessed a surge in demand for transport infrastructure and services which needs to be reliable, affordable and efficient to ensure equitable access to opportunities of work, education, leisure, etc.

Presently, urban transport in Indian cities is already generating a worrying situation characterized by high levels of

Link between Transport and the Economy[4]

Transport system
Modal split, type and size of infrastructure and network

Economy

Activity pattern
Industry, businesses, households

Access
Location, land use, property prices

Spatial structure and organisation
Production, distribution, consumption / Working, leisure activities

traffic fatalities[5], congestion[6], environmental pollution[7], and mobility problems for the poor. Urban population growth has increased urban trips and the consequent travel demand creating an imbalance between travel demand and transport infrastructure supply. However, as we will see this change need not be unsustainable.

This scenario is evidently not sustainable if India's residents want to have a good quality life in the coming future. For an effective outcome, India must begin scaling sustainable transport and ensuring that it is integrated with land development. The sustainable development of cities largely depends upon their physical, social, and institutional infrastructure. In this context, the importance of transport infrastructure is paramount. The need for better transportation facilities comes after an improved infrastructure framework, which can be achieved by focusing on urban development as a whole.

World over, urban planners have given up reliance on widening of roads and construction of flyovers as an answer to the problems of urban transport. They have instead proved and propagated pedestrianization[9], cycling-friendly cities[10], car-free zones[11], restraining vehicle ownership and parking charges, and promotion of mass public transport with a special emphasis on buses as a viable and more lasting solution. Experiences of cities which are considered pioneers in the field of sustainable urban development and transportation like Amsterdam, Paris, London and Singapore have shown the world how a move in this direction can achieve phenomenal relief for the cities and boost economic growth.

Sustainable urban planning practices can steer urban growth towards low-carbon urban development by advancing climate-friendly urban forms (compact, mixed land-use, and connected and accessible cities) geared towards reducing vehicular trips and instead, encouraging the use of non-motorized transport (such as walking and cycling) and public transport.

Conceptual reciprocal relationship of urban growth and transport[8]

Transport

Travel Demand → ← Transport Infrastructure

Induce *Catalyze*

Urban growth

Population → ← Land Use
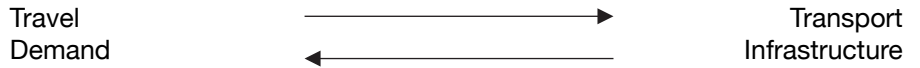
Since the mid 20th century, the world's urban population has more than doubled, and by 2050 70% of the global population could be urbanized[13], where cities would be dominating national economic output. As the world undergoes urbanization, it has become an urgent need that city expansion takes place in a planned manner to prevent urban sprawl and to help growing numbers of residents reduce their carbon footprint. When cities are compact, transport provision and other basic services like waste management, water and sanitation is not only resource-efficient but also financially viable. Therefore, an urban development strategy that combines compact city planning with good governance and equitable provision of basic services including sustainable, affordable and efficient public transport, is much needed.

Sustainable Development Goal and Targets

Goal 11:

Make cities inclusive, safe, resilient and sustainable[12]

Rapid urbanization is resulting in a growing number of slum dwellers, inadequate and overburdened infrastructure and services (such as waste collection and water and sanitation systems, roads and transport), worsening air pollution and unplanned urban sprawl.

Targets

11.2

By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

11.4

Strengthen efforts to protect and safeguard the world's cultural and natural heritage

11.6

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

Urban development, planning and transportation

Addressing a meeting of Mayors convened by C40 cities on 16 April 2021, the UN Secretary-General António Guterres said: "Cities are also on the frontlines of the climate crisis. More than half a billion urban residents already face rising sea levels and more frequent or severe storms. By mid-century more than 3.3 billion urban residents could be at risk from severe climate impacts. Cities also have an outsize carbon footprint. With just over half the global population, they emit more than 70% of global greenhouse gases. The COVID-19 pandemic is a global catastrophe. But investment in recovery is a generational opportunity to put climate action, clean energy and sustainable development at the heart of cities' strategies and policies. How we design power generation, transport and buildings in cities – how we design the cities themselves - will be decisive in getting on track to achieve the Paris Agreement and the Sustainable Development Goals. We need a revolution in urban planning and in urban mobility: including better fuel efficiency; zero emission vehicles; and shifts toward walking, cycling, public transport, and shorter commutes. Cities stand to gain most from phasing out coal: clean air; green outdoor spaces; healthier people."

Maharashtra

Maharashtra has seen the highest level of urbanization in India at 45.23%[14] compared to 31.16% as the all India average in 2011. Maharashtra is the third most urbanized state in the country, behind only Tamil Nadu (48.45%) and Kerala (47.72%). In terms of absolute number of persons living in urban areas, Maharashtra continues to lead with more than 5 crore of urban population which is 13.5% of the total urban population of the country. With such a big population already living in urban areas, the ways in which future urban growth and development is managed by the state and local government will greatly determine the extent to which the sustainable development goals (SDGs) are met.

Maharashtra's road network totals about 303,350 km, including 34 national highways (12,275 km) connecting to six neighboring states. As of 2016, Maharashtra had India's largest road network based on total state highway length (22.14%). The share of buses in Maharashtra has declined to an abysmal 0.47% of all registered vehicles in 2016 from 2.93% in 1971. Private vehicles, on the other hand, are growing at a devastating rate. Two-wheelers, which in the year 1971 constituted only 28.25% of total vehicles on roads, in 2019 constitute an alarming 75%. The total number of registered vehicles in the state in 2018 was 31.4 million.[15]

Efforts to increase the road infrastructure to meet the strain of so many increasing vehicles is going to be inadequate and expensive, and yet that's what is happening in our cities today.

Public transport is poor and even non-existent in most of the cities which have seen an explosive growth in vehicles and with it, chronic congestion and pollution. For an industrialized state like Maharashtra, there are only 11 buses per lakh population. Most of the Municipal Corporations (population > 3 lakhs) do not have a city bus service at all. Even the better performing cities are no better. While Mumbai has about 30 buses per lakh population Pune has 26, both short of the 50 buses per lakh population benchmark set by the Ministry of Housing and Urban Affairs. Excluding these two cities, there are only 4 buses per lakh urban population in the rest of the State.

This lack of buses leads to:

1. Overcrowding and long waiting hours

2. Depriving people of livelihood and education opportunities

3. Shift to expensive and polluting transport options

4. Resurgence of private vehicle usage

5. Compromise on physical distancing measures

Despite the well-established role of urban bus transport in cutting air pollution, bringing down carbon emissions, improving the urban experience and liveability of cities, it remains understated in city development policies, and programs. Focusing on the urban bus system is an essential overhaul long due in imagining and designing interventions to address development concerns in urban Maharashtra. It's past time that urban regions transform their bus network.

An important case in point is London. Despite having a metro network of 1000 kms which is more than the metro network put together for India, more journeys are made on London buses than metro. London has recognised that buses are fundamental and there are around 9,000 buses for a population of 90 lakh people and given that ¾ of these buses are double-deckers it roughly translates to 15,000 to 16,000 buses. The case is not different for Delhi. Even after 490 km of Metro network, more people[16] continue to travel in buses than metro.

Subsequently, it is important for the Urban Development department (UDD) to analyze if metro projects that are being built over the arterial roads in many cities, could be overturned in favor of bus corridors.
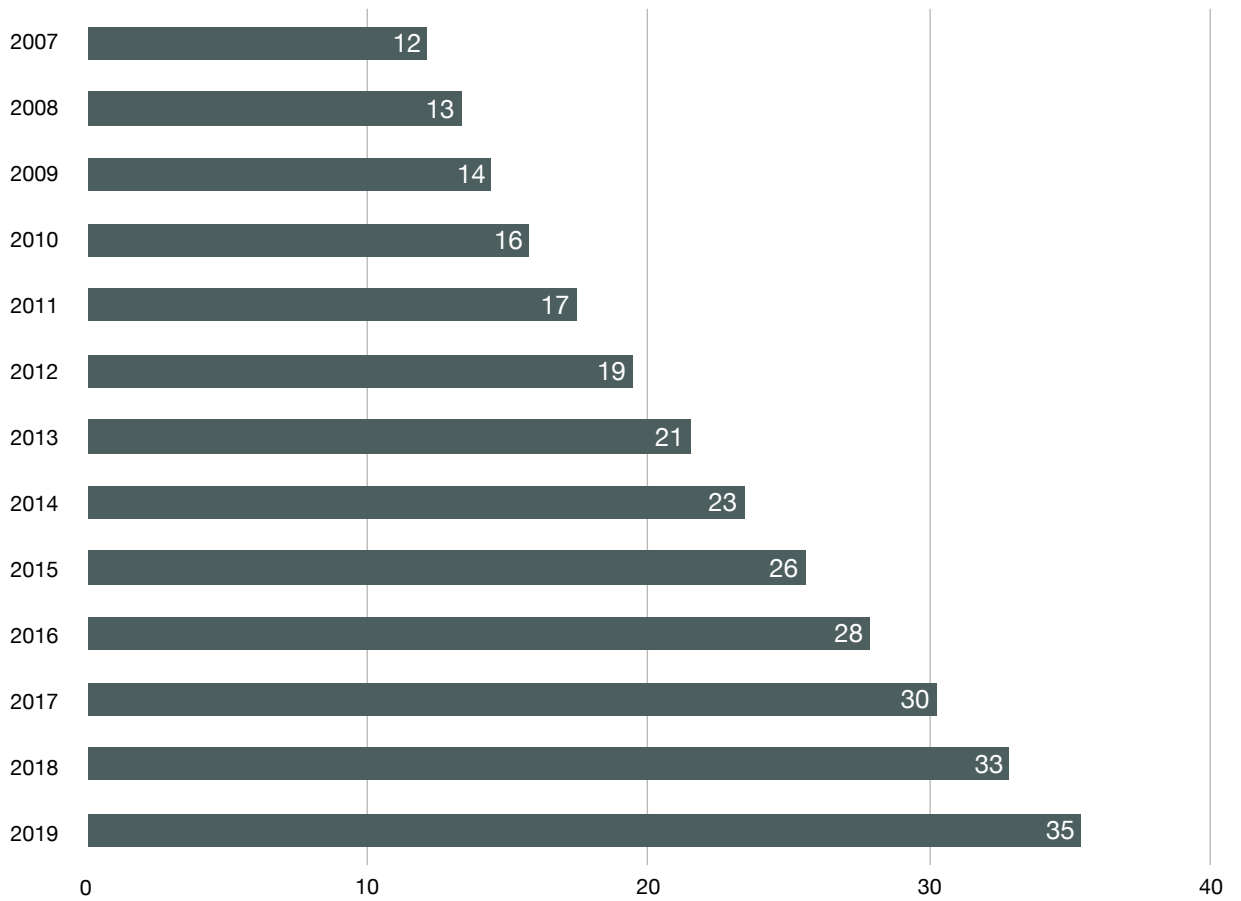
Registered vehicles in Maharashtra (millions), 2007 to 2019

Source: www.statista.com
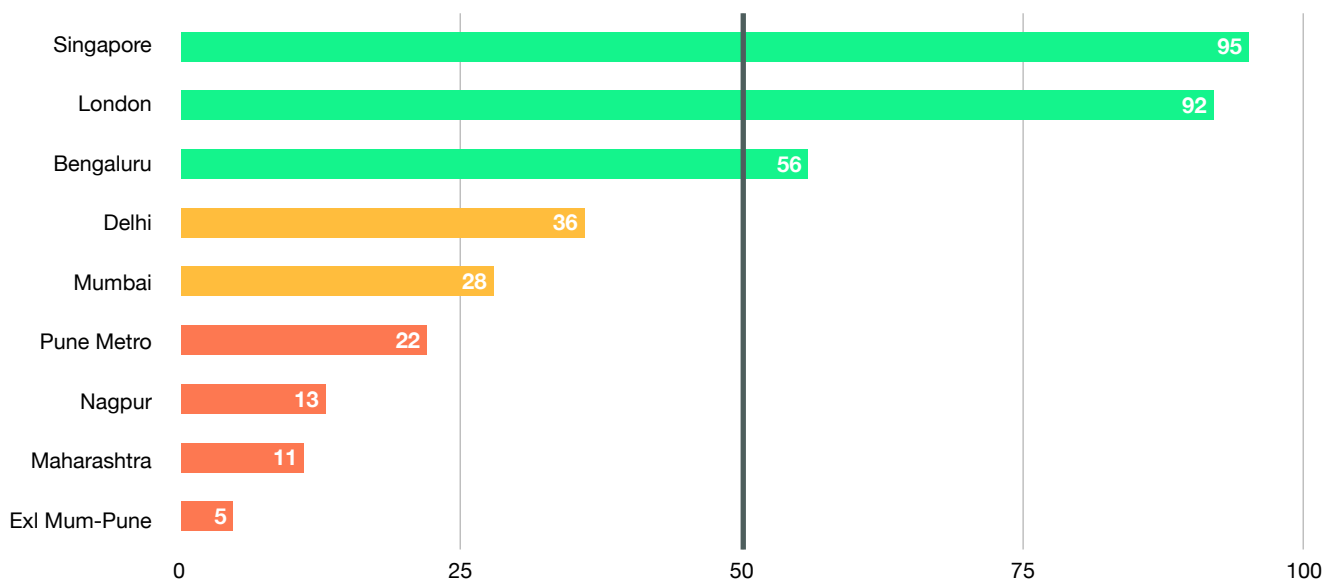
Buses per lakh population - Global best vs Maharashtra

City development plans and public transport

Whenever we talk about creating economically productive, socially inclusive and environmentally sustainable cities, we reflect on both a perspective and a vision for the future development of a city. A city's Development Plan brings exactly these two aspects together. It is mandated by law, under each state's town planning or urban planning legislation. It sets out the directions of change - i.e. where do we want to go. It also presents the current stage of the city's development - i.e. where are we now. And then taking into consideration these two scenarios it identifies the thrust areas - i.e. what needs to be done or addressed on a priority basis and suggests strategies and interventions for bringing about that change - i.e. how do we attain the vision. In a vision document like this, planning how a city would run is of utmost importance.

Successful urban development is achieved through transport planning that focuses on movement of people rather than vehicles, a goal clearly expressed in the National Urban Transport Policy (NUTP)[17] by the Ministry of Urban Development, Government of India. Even the draft State Urban Transportation Policy (SUTP) for Maharashtra prioritizes sustainable modes of transport—walking, cycling and public transport—and dissuades the use of personal motor vehicles. It urges the state government to invest in transport projects that are sustainable and represent the best value for all citizens for the money expended.

Making plans for areas beyond municipal limits and issuing a set of guidelines to incorporate transport within the framework of a Development Plan is important in order to move towards cities that are not dominated by private vehicles and where people without cars or two-wheelers are not mobility impaired. Basic street networks and grids need to be planned around public transport. Interventions are required at the stages of making a plan, and implementing it.

"Plans are still made for areas within municipal limits. The local area plans must be made for peri-urban areas outside municipality boundaries so that a plan allows for the future as it unfolds. Public transport planning ahead of the demand has many benefits which should be included in the cost-benefit analysis of transportation. The Urban Development Department should ensure that guidelines are issued for planners to incorporate transport in the framework of a development plan."

Vidyadhar K Phatak

Former Head of the Planning Division, MMRDA &

Dean, Faculty of Planning, CEPT University

Integrated land-use transport planning

As mentioned before, cities in Maharashtra are seeing accelerating two-wheeler ownership, checked only by increasing rates of four-wheeler ownership. Public transportation share is decreasing, as the demands for private transport modes increase. The middle class is growing, and one of the first signs of affluence is the family's purchase of an automobile.

Urban design and land-use planning regulations should support the creation of compact communities with access to high-quality public transport and walking and cycling links, often called transit-oriented development (TOD). TOD regulations are applicable in a 500 zone around the Metro Corridor as well as the BRT, with restricted parking, higher FSI and the need for an "Integrated Mobility Plan envisaging

therein inter-linkages between different modes of mass transport, parking management, traffic management and pedestrianisation".

Such development that accommodates residences, jobs, places of commerce and recreation, and other uses within walking distance of high-capacity public transport stations can help reduce trip lengths, congestion, and dependence on personal motor vehicles.

The state government needs to adopt land use regulations that incentivise higher density commercial and residential development within walking distance of major public transport corridors. Regulations and transport investments should direct the majority of urban growth along public transport corridors and reinforce existing urban centers by providing good public transport access.

As urban buses are run and managed by different entities, several common resources like depots and bus stops are not shared. Therefore, it is important that public land is repurposed for public use. For instance, PMPML does not have sufficient[18] bus depots which leads to as many as half of the buses being parked on the streets.

An example of urban development though bus based transit system: Curitiba

The bus system of Curitiba, Brazil, exemplifies a model BRT system which plays a large part in making the city more livable. The buses run frequently and reliably, the stations are well designed, convenient and attractive. Around 70 percent of Curitiba's commuters use the BRT to travel to work, resulting in congestion free streets with good air quality for the 2.2 million inhabitants of greater Curitiba.

The planners of the city recognized that the development of infrastructure in the city can be used as a guide to the city's development. A transportation land use integration model was adopted early to address the urbanization and rapid sprawling of the city. It later on played an important role in realization of a master plan which turned out to be a system of median busways along the five proposed bus lanes (called structural axes) complemented by direct service on parallel roads and by an extensive feeder bus network.

The system, termed the Rede Integrada de Transporte (RIT – Integrated Transport Network), provides a hierarchy of types of bus service, which include city bus-ways, inter-district express service and feeder network, all operated under an integrated tariff system. Curitiba achieved its intended compact development, independent of private vehicles, using policies and practices in majorly four arenas- land-use planning, public transportation, parking policies and institutional mechanisms.

A clear vision, strong leadership and flexibility in the plan have led to the success of TOD in Curitiba as well. Curitiba established a public transit system at relatively low cost by utilizing the existing corridors for BRT and adopting measures to increase the development along those corridors. The local governments effectively directed population growth to establish compact dense settlements independent of private vehicles through the use of public transportation and land use instruments.

Both the development of the city and the bus rapid transit system are the result of policies established over the last 30 years on land-use, parkway, transit management and operations, and community participation in the city.

Heritage and urban development

The built, cultural and natural heritage of Indian cities is under tremendous pressure due to rapid urbanization, motorization, and socio-cultural and climatic changes. Heritage is often considered a stumbling block to development. However, experiences of countries in Europe (a few cities in France have integrated sustainable heritage conservation into local urban planning frameworks with public transportation anchoring this integration) and few states in India (Puducherry's streetscape restoration along Vysial street constitutes lessons in cohesively enhancing the neighborhood character) show that cities can also thrive on conservation, earn revenues, become self-sustaining, all while enhancing liveability. In other words, heritage can also pave the way for development.

Maharashtra is one of the most popular states for cultural and natural heritage with 5 UNESCO World Heritage sites, one natural site (Western Ghats), and 244 state protected monuments[19] and 285 monuments of national importance under the Archaeological Survey of India (ASI)[20]. However, this rich heritage has exceedingly suffered due to uncontrolled development and ill-managed transportation, failing to keep up with the present needs and unlikely to survive future challenges.

On one hand, the challenges and pressures which threaten urban heritage and implementation of conservation policies are duly placed within the broader urban fabric. On the other hand, the solutions to restore and safeguard the heritage remain focused on the structure alone at the cost of ignoring the wider urban context. Enhancement and conservation that holistically dovetails into the agencies of city planning, urban and economic development could be a powerful tool to address this conundrum.

Furthermore, managing mobility has been one of the main challenges faced by historic cities. While public institutions in India and Maharashtra have recognised the significance of, and extended policies for limiting road traffic, promoting pedestrian mobility and the valorization of urban commons, the same lack teeth due to poor enforcement. The increasingly leading role of urban tourism – and particularly of Cultural and Heritage Tourism - poses interesting challenges on the design of a mobility policy for historic cities. Therefore, something along the lines of a Sustainable Urban Mobility Plan or Mobility Management for Heritage with a focus on bus-based public transport can lead to enhanced livability of cities, while preserving the local cultural heritage, and reducing the environmental impact. Such a plan would create a model for city development that ensures preservation of heritage and heritage-based development.

The cities in Maharashtra are craving for decongestion of roads. The historic urban spaces (be it the peth area in Pune or the Fort area in Mumbai) are gasping for breath, choked as they are with ever increasing cars, two-wheelers parked on the roads. What needs to be put in place, instead, is an efficient public transport system, with more frequency and preferably with dedicated corridors to ensure the movement of the maximum, collectively contributing towards the sustainable development of the historic centers, which are generally, market centers as well. For instance, PMPML in Pune recently introduced a day ticket of only Rs. 10 for the core area which was received really well by commuters and also increased the ridership.

"When it comes to preservation of heritage, culture and the urban fabric, the focus should be on the wholeness of cities as an organism rather than assembling different parts as knee-jerk reactions."

Narendra Dengle

Author and Architect & Chairman, Advisory Board, Goa College of Architecture

A Sustainable Urban Mobility Plan or Mobility Management for Heritage with a focus on bus-based public transport for cities of Maharashtra can:

1. Enhance the liveability of cities

2. Ensure easy access to heritage sites for not only tourists but also local residents.

3. Promote healthy transportation habits with a focus on walking, cycling and public transport

4. Minimize the negative impacts of tourism, trade and commercial activities in the core areas of city

5. Enhance the image of cities as tourist destinations, promoting local economic development.

Urban Development Department and Lakh ko 50 campaign

The Urban Development Department, Government of Maharashtra, must play a key role in ensuring that all cities in Maharashtra have an efficient bus-based public transport system for enhancing the livability of cities. We recommend that the UDD:

- Recognize the importance of an efficient bus-based public transport (BBPT) system for healthy, developed and sustainable cities, and raise awareness about the same amongst the general public and decision-makers.

- Include the goal of a reliable, accessible, well-planned and affordable urban transport system within the agenda of the Urban Development department (UDD).

- Provide for a city's requirement of buses by stipulating specific norms and guidelines for bus-based public transport within the framework of a city's Development Plan.

- Ensure that the Comprehensive Mobility Plan (CMP) of a city which must include the provision of BPPT, is taken into cognizance when the Development Plan is being drafted.

- Reassess and update existing BPPT-related guidelines like provision of depots and terminals per lakh population, and ensure their proper implementation.

- Ensure that Traffic Impact Assessments are duly carried out for major urban development projects.

- Enable public transport planning ahead of the demand by allowing local area plans to include peri-urban areas.

- Allocate resources from the State for provision of quality-level bus services, especially in Tier-II and Tier-III cities of Maharashtra.

- Recognise urban transport as a multi-sectoral issue and work in coordination with allied departments (transport, environment, finance) to improve bus-based public transport services and champion a state urban bus-based public transport policy that is inclusive of the aforementioned recommendations.

These recommendations directly address the core challenges that will continue to get worse unless changes are made. While buses are a space- and cost-efficient means to move large numbers of people, they are currently not being used to their potential. Without the correct interventions, the city buses run the risk of becoming the mode of last resort, or worse, the mobility option reserved only for those who have no other choice.

"More buses should be added by the cities to improve the frequency and ridership. Currently, Pune and Pimpri-Chinchwad have half of the fleet required to serve the existing population. Adding 1600 buses to the existing fleet can help the city in achieving its 2031 vision of 35% trips on public transport[21]."

Eknath Shinde, Cabinet Minister of Urban Development, Government of Maharashtra

List of abbreviations

BPPT	Bus-based Public Transport
BNCA	Dr. Bhanuben Nanavati College of Architecture
CMP	Comprehensive Mobility Plan
DP	Development Plan
GDP	Gross Domestic Product
MMRDA	Mumbai Metropolitan Region Development Authority
PMC	Pune Municipal Corporation
PMPML	Pune Mahanagar Parivahan Mahamandal Ltd
UDD	Urban Development Department

References

1. https://niti.gov.in/planningcommission.gov.in/docs/plans/planrel/fiveyr/11th/11_v3/11v3_ch11.pdf

2. https://censusindia.gov.in/2011-prov-results/paper2/data_files/india/paper2_1.pdf

3. https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS

4. https://www.researchgate.net/publication/305589858_Analysis_of_the_link_between_Transport_and_Economic_Growth

5. https://pqars.nic.in/annex/256/AU3922.pdf

6. https://timesofindia.indiatimes.com/city/pune/pune-5th-most-congested-city-globally-reveals-traffic-index/articleshow/73746668.cms

7. https://cpcb.nic.in/uploads/Non-Attainment_Cities.pdf

8. https://www.researchgate.net/figure/Conceptual-reciprocal-relationship-of-urban-growth-and-transport_fig1_261947351

9. https://ec.europa.eu/environment/pubs/pdf/streets_people.pdf

10. https://www.itdp.org/wp-content/uploads/2019/01/ST_30_FINAL_.pdf

11. https://www.weforum.org/agenda/2022/02/are-cars-an-urban-design-flaw/

12. https://www.un.org/sustainabledevelopment/cities/

13. https://www.fastcompany.com/1669244/by-2050-70-of-the-worlds-population-will-be-urban-is-that-a-good-thing

14. https://www.researchgate.net/publication/319553254_LEVEL_OF_URBANISATION_AND_THEIR_DISPARITIES_IN_MAHARASHTRA_STATE

15. https://morth.nic.in/sites/default/files/RTYB-2017-18-2018-19.pdf

16. https://www.statista.com/statistics/1240001/india-average-daily-ridership-of-public-transport-in-delhi/

17. https://mohua.gov.in/upload/uploadfiles/files/TransportPolicy.pdf

18. http://indianexpress.com/article/cities/pune/for-every-bus-parked-at-pmpml-depots-another-stands-outside/

19. https://dbpedia.org/page/List_of_State_Protected_Monuments_in_Maharashtra

20. https://dbpedia.org/page/List_of_Monuments_of_National_Importance_in_Maharashtra

21. https://www.itdp.in/pmpml-pune-mahanagar-parivahan-mahamandal-ltd-celebrates-bus-day-foundation-week-2022/

परिसर SUM Net India
Sustainable Urban Mobility Network

SUM Net is a coalition of individuals, voluntary organizations, and civil society networks and movements promoting sustainable urban transport solutions across India.