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A STUDY ON PUNE URBAN TRANSPORTATION CRISIS AND APPROACH TOWARD SUSTAINABLE TRANSPORTATION

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Abstract: Pune is among the oldest cultured cities in India, with a 600-year heritage. Pune had tremendous rise in development in the early 2000s, especially between 2001 to 2007. Pune is considered as the Oxford of the East, with students from all across the country residing in the city for several years. During this time, the industrial and tourism industries began to expand alongside the academic sector. Pune has seen massive migration from all around the country as a result of growing urbanization. The city has begun to face many urban crises as a result of the outburst of rising population, such as road congestion, traffic jams, lack of public transportation, decreasing road safety, parking issues, and carbon emissions. The cause of this disaster is an increase in the number of automobiles on the road, insufficient public transit, and the continued expansion of suburban. This study investigates the challenges that cities confront in terms of urban transportation, as well as the impact of urban transportation infrastructure on urban sustainability.

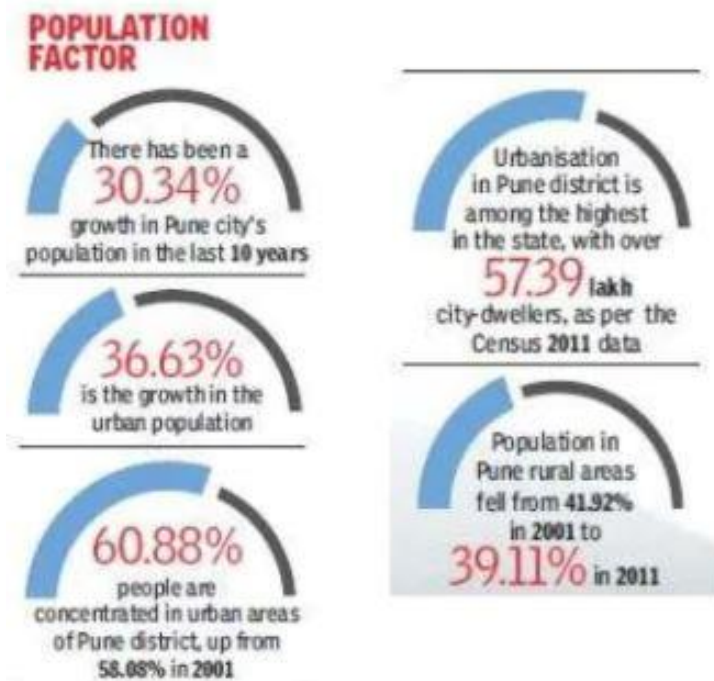
Key words- Pune, poor public transportation, sustainable transportation, urbanism

I. INTRODUCTION

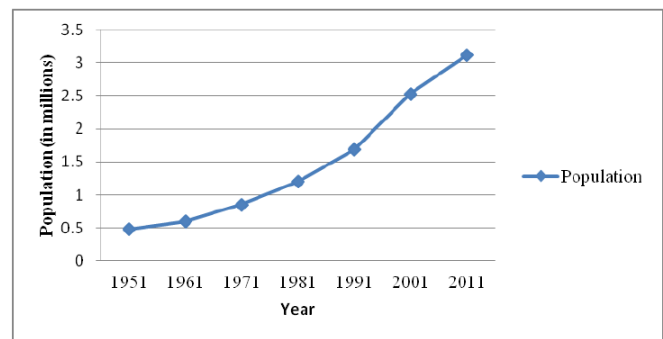
Population of Pune has grown by 73.36% by time period of three decade and city has expanded from 146 sqkm. to 331 sqkm on present day due to merging of 43 villages surrounded by the city in Pune Metropolitan Region Development Authority (PMRDA). Pune is situated at an altitude of 570m in between Sahyadri hills on banks of river Mula and mutha. The adjoining of mountains offers the city good natural ambience, pleasant climate on city surrounding throughout a year. Pune is a uprising industrial and IT hub of India as well as the city having numerous top ranking universities for various fields it is known as Oxford of Maharashtra. Pune has named one of the most liveable cities among 111 cities all over India by department of housing and urban affair ministry. Even though infrastructure of Pune city has seen progress in recent years, the rapid growth in population has seen reaching peak in the city. The explosive growth of city is causing constant problems of poor road connectivity, transport, solid waste management and insufficient supply of water in the areas of periphery of the city. One of the most observed key problem Pune is facing right now is need of smooth **mobility** and poor **Public Transportation**. The traffic issue in cities like Pune is getting worse by the day. The death rate is one person per day, or 10 to 15 people per week, which is quite high due of the city's chaotic, undisciplined traffic and the population's lack of traffic awareness. Infrastructure is a vital tool for a country's growth, and transportation accounts for 80% of overall infrastructure. In comparison to other affluent countries, India has a relatively inadequate infrastructure. These issues can be addressed by increasing capacity, making effective use of available infrastructure, inhibiting or supporting other forms of transportation, and even influencing people's and freight's travel habits.

II. RECOGNITION OF A SITUATION

Mobility has a direct impact on the economic efficiency of cities and the well-being of urban residents. The effectiveness of a city's transportation networks, or the efficiency with which people and products are moved across the city, is crucial to its efficiency. Pune has consistently been one of the fastest-growing cities in the Asian-Pacific region. From 1991 and 2001, the city expanded by 40%, reaching 1.6 million to 2.5 million people. Pune's decadal rate of growth has averaged nearly 40% for the past 40 years, and it is anticipated that the population would reach 5.6 million by 2031 if the above situation continues.



Source: Pune DP, Pune CDP



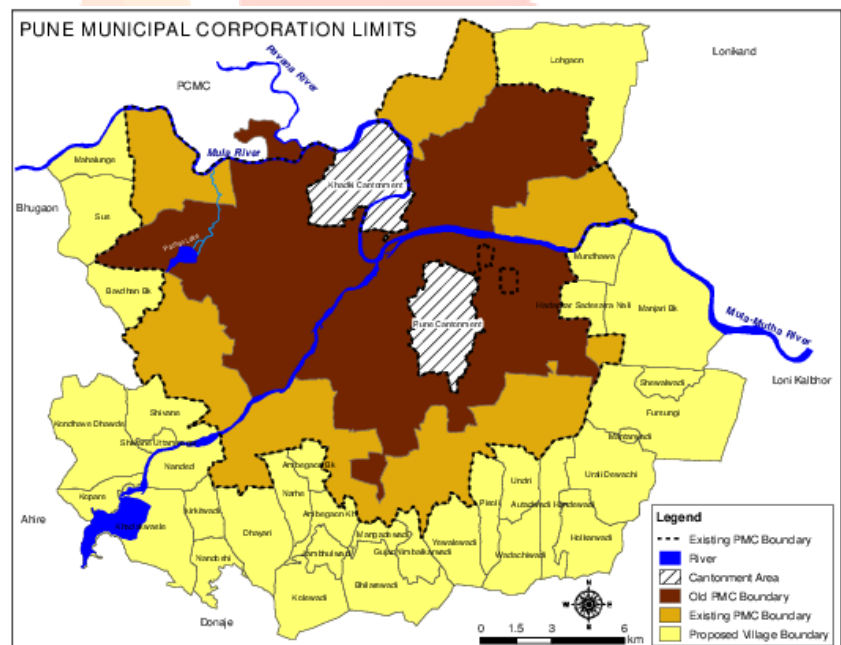
Source: censusindia.gov.in

As a result, Pune has grown into a significant city in the state, attracting engineering firms and automobile manufacturing factories. Much of the local industry is centered along the major Pune-Bombay highway, allowing produced goods and supplies to be delivered to manufacturers without having to travel through Pune's crowded downtown area. Pune Metropolitan Region has recently been successful in capitalizing on its intellectual base, pleasant environment, and strategic placement near India's financial center. It has attracted prominent InfoTech and Communication sectors in a short period of time.

The following are among the most probable causes of traffic congestion or poor traffic in Pune.

A) Road network

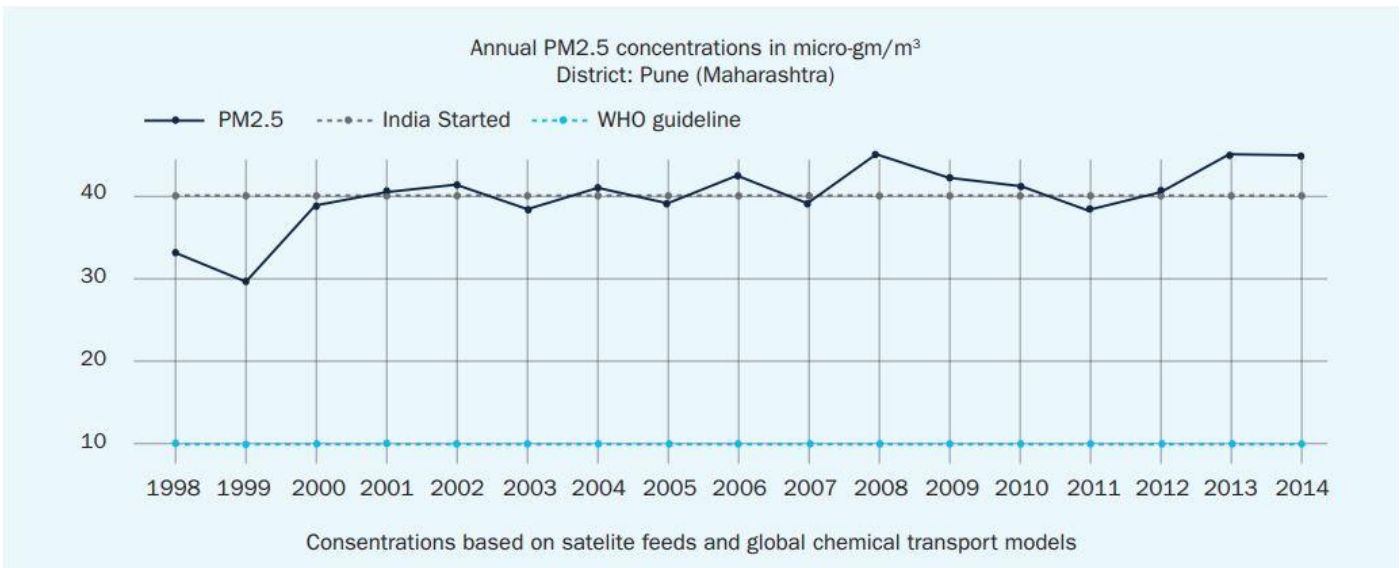
Pune traffic has increased by 105 times as a result of population growth, whereas the road network has only grown by 6 times. The city's present road network accounts for 7% of the total, whereas the efficient demand is 15%. Inadequate road networks result in massive heavy traffic and time wasting rather than excellent urban movement across the metropolis. Roads in the city are in deplorable state. On city roadways, there are a few potholes in between. The city's road infrastructure has not grown in lockstep with the growing number of automobiles. The city's population has expanded fourfold in the previous three decades, while car population has increased 87 times and road length has increased just five times. The overall number of automobiles in Pune district has surpassed 61 lakhs, with roughly 39 lakh vehicles in the city and surrounding regions, including PCMC and PMRDA. The number of new cars registered in the district has climbed by 4.5 lakh, according to statistics published by the Regional Transport Office (RTO). The number of registered motorcycles has increased by barely 3 lakhs. According to census statistics, the population of Pune district is expected to reach 57 lakhs by 2031. As a result, the ministry of road and transportation must fulfil both present and emerging aspirations for road and transportation facilities.



Newly Proposed 34 Villages in Pune. Source: Modified from PMC, 2013

B) Air pollution

The air quality in Pune, India, has degraded substantially throughout the last five years. According to data gathered by the Indian Institute of Tropical Meteorology (IITM), 2018 was the second most polluted year since 2013. The Urban Emissions Air Pollution Knowledge Assessment programme shows that air quality in Pune is still a major public health concern. According to the study, yearly levels of PM_{2.5} air pollution in Pune frequently exceed health-based pollution guidelines, based on global chemical transport models and satellite surveillance.



Source: NRDC air pollution

B) Insufficient public transports

The rapid growth of the automobile population, combined with a shaky public transportation system in the form of the Pune Mahanagar Parivahan Mahamandal Ltd (PMPML), has resulted in severe traffic congestion, increased commuting time, an increase in the number of road accidents, and extreme stress during peak hours. There are at least 1,000 buses lacking from the present fleet of 1300 buses (including many buses undergoing maintenance) and 150 electric buses with regular failures. As a result, individuals are compelled to use private cars, two-wheel vehicles, taxis and auto rickshaws, resulting in an increase in the number of vehicles on the road.

C) Safety Concern

People intend to break the traffic rules during rush hours, instead it led to unsafety on road for pedestrian, accidents and traffic congestion. Most of Auto rickshaw drivers are a problem in the city due to their rash driving, they control the roadways and use unsafe shortcuts to get ahead, putting their passengers lives at jeopardy. Work on road repairs and extension has been ongoing for the past two years and has yet to be finished. As a result, pedestrians have a difficult time walking on the road due to the poor state of the whole stretch. Residents have raised a number of issues, including road widening that has been ongoing for more than five years, the absence of street lights on various roads, market stalls and roadside vendors intruding on the road and leaving minimal space for traffic flows, causing a danger to pedestrians.

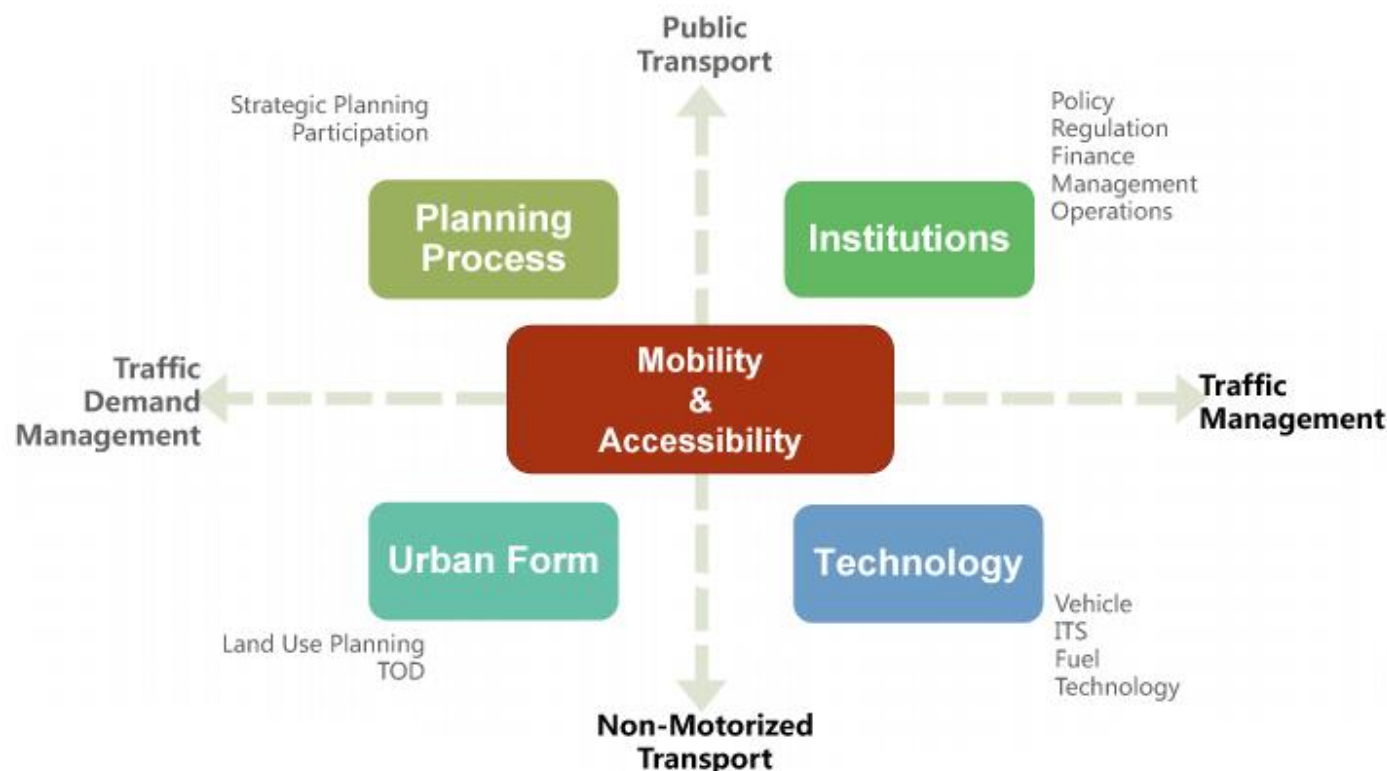
D) Inadequate transit management

Throughout peak hours, i.e., 9:00 a.m. to 11:00 a.m. and 6:00 p.m. to 8:00 p.m., traffic becomes more congested and disorganized in sectors where most schools and colleges are situated, particularly in Peth areas with narrow roads and lanes, IT offices in Hinjewadi and Kharadi, and the Industrial Zone at Bhosari, but nowadays the misbehaved traffic management can find at any time of the day. Most of the time, traffic congestion and disrupted transit flow are caused by mismanagement of traffic control authorities, inoperable traffic signals, and people violating traffic rules.

III. NECESSITY OF SUSTAINABLE URBAN TRANSPORTATION SYSTEM:

People and freight mobility are necessary for metropolitan areas to grow socially and economically. Motorized vehicles, particularly two-wheelers, buses, automobiles, and trucks, have become the most significant mode of transportation in most Indian cities, at the expense of non-motorized and public transportation. Congestion, traffic dangers, air and noise pollution, altering land-use patterns, social isolation, and other issues have emerged as a result of this. These issues have been shown to pose a severe danger to improving social and economic possibilities. It asks for a long-term transportation system that emphasizes people's mobility, accessibility,

liveability, the environment, overcrowding, equity, and other factors, while also considering future generations' financial and environmental needs.



Source: Sustainable transport system in Chinese cities

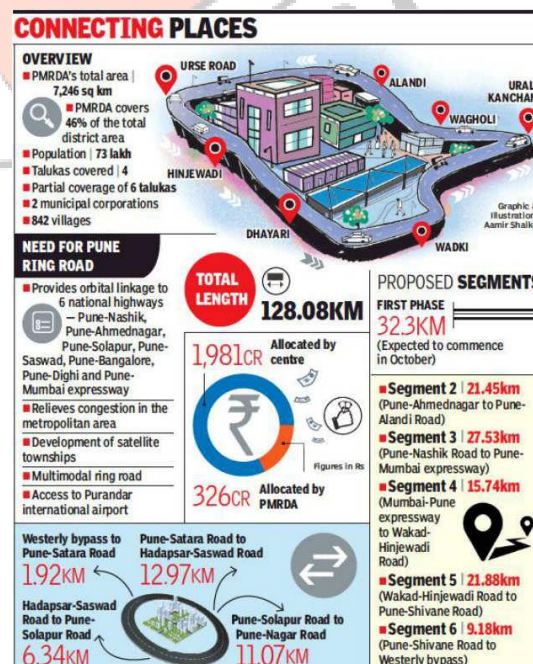
Many social and economic benefits of sustainable transportation might help to expedite local sustainable development. By investing in bicycle lanes and pedestrian walkways, sustainable transportation may help create jobs, enhance commuter safety, and make access to work and social activities more inexpensive and efficient. It also provides a real potential to save people's time and money, as well as government budgets, making sustainable transportation a 'win-win' situation.

IV. APPROACH TOWARDS SUSTAINABLE TRANSPORTATION

4.1) Proposal of ring road



Proposed Ring road. Source: MAHARASHTRA STATE ROAD DEVELOPMENT CORPORATION LIMITED



Source: Times of India

With regard to land usage, physical characteristics, and road design, the proposed Pune Ring Road, which is wholly a greenfield route, has multi-dimensional aspects. The project route will be a 6-lane highway built to expressway standards, with the option of expanding to an 8-lane in the future, as determined by the Client. Based on the preliminary findings, a section-by-section policy for creating the ring road was selected. According to the Pune Metropolitan Region Development Authority (PMRDA), the route would reduce traffic congestion and provide access to the city's fastest-growing districts.

Due to industrial and other socioeconomic growth in and around Pune, traffic in and around the city is expanding rapidly. The city of Pune is traversed by several arterial roadways. Pune is crossed by National Highways 4, 9, and 50, as well as a number of key State Highways. As a result, all roads emanating from the city must be extended from four to six lanes. However, cars arriving from one way and heading in the other direction went through Pune City, causing traffic congestion. If this passing traffic is routed via a road network outside the city periphery, it will help address the internal city traffic situation. The strain of external floating traffic on the intra-city road network is steadily growing in the absence of these peripheral linkages.

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4.2) Rapid transit system

The public transportation operator in Pune and Pimpri & Chinchwad, which maintains buses and BRT services, has struggled to meet the city's transportation demands. Urban sprawl has put the city's transportation system under strain in recent years. The city's traffic is increasing at unsustainable rates due to a surge in small, medium, and heavy industries. While the city's roadways are narrow, they provide to a variety of vehicles at the same time. The Pune Metro, which was first proposed in 2002, is set to open in 2020. This section of the Pimpri-Chinchwad to Swargate Line-1, which will eventually incorporate three lines of the metro, is expected to be operational by March 2020.

Public transportation is a space-efficient mode of transportation with low levels of air and noise pollution. As the city's population expands, the use of public transportation, whether by road or rail, should rise. Research has revealed that on Pune city roads with insufficient width and that respond to mixed traffic conditions including both slow and rapid moving vehicles, road transport could carry 8000 people per hour in each route. When traffic volume exceeds this level, average vehicle speed decreases, trip duration increases, air pollution rises, and passengers experience greater annoyance. As a result, the metro system has taken into account seamless transportation.

When comparing to a road-based network, the metro system has some benefits for transportation sustainability. For example, it uses 1/5th the energy per person kilometre. Reduces Air pollution and noise pollution in the city. The amount of space occupied is far less. Because a metro carries 5 lanes of bus traffic or 12 lanes of private automobiles, the number of vehicles on the road will immediately decrease. It is more dependable, pleasant, and secure than a system based on roads. Most notably, the metro cuts travel time in half to seventy percent.



Pune Metro transit route. Source: mahametro.org

4.3) Electrical Bus transportation

Battery electric buses are one of the most common forms of electric buses nowadays. Due to their restricted range, buses are often utilised in cities. Driving in the city necessitates a lot of acceleration and braking. As a result, the battery electric bus outperforms the diesel bus in terms of recharging kinetic energy into batteries during braking, reducing brake wear. In cities, using electric propulsion instead of diesel decreases noise and pollution.

The electric buses that are being added to the systems of Indian municipalities are the country's first significant attempt at using the technology. How they function will have a significant impact on how Indian cities see electric buses in the future.

PMPML (Pune Mahanagar Parivahan Mahamandal Limited) has introduced 25 electric buses (e-buses) to its fleet to help decrease pollution and save money on diesel. The smart city initiative will add 150 new e-buses in the first phase and 350 additional e-buses in the second phase. The expense of maintaining these buses, on the other hand, is rising. Recharging the current 25 buses costs 9 lakhs every month. As a result, according to sources, the transportation agency will add 400 additional CNG buses to its fleet.



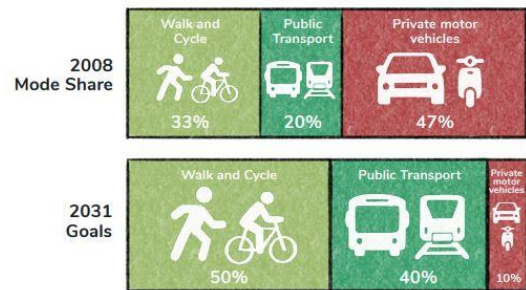
PMPML E-Bus.

4.4) Walking and Bicycle transportation mode

Walking is a popular mode of transportation for short distances. As a result, assessing pedestrian mobility at the country level is problematic. In addition, the walking portions of trips done largely by public transportation are frequently overlooked. As well as bicycle is used for short journeys to the store and for recreational purposes, when a cycling tour is most often an objective in and of itself. Cycling is, nonetheless, a popular mode of transportation to work in many nations. Home-work journeys account for

between 30 and 40 percent of all bicycle kilometres travelled. The health advantages of cycling and walking on a daily basis rather than driving for short excursions exceed the hazards of air pollution inhalation.

Pune has established a standard for a pedestrian- and cyclist-friendly city. The city has established several progressive policies and programmes directing the change on the ground, according to the ITDP (Institute for Transportation and Development Policy) study, to ensure a comprehensive approach to developing functional and habitable streets. Pune's Walk Smart Policy was created with the goal of making the city more pedestrian-friendly. It makes suggestions for adding walkways, safe crossings, and pedestrian-only zones, as well as streamlining traffic lanes and lowering speed of vehicles. The Integrated Bicycle Plan was created to serve as the city's principal guide for allocating resources, implementing projects, and evaluating the results in order to meet the city's goals for increasing bicycling in Pune.



Goal toward sustainable transport proposed by ITDP.
Source: itdp.org

V. MEASURE TO BE TAKEN

It is necessary of development of additional road network in the city. The building of bypasses to reroute through-traffic is among the most often used strategies of combating traffic problems in medium and small cities, as well as in regions of bigger cities. Large expanses of land are required for the building of an urban freeway network with access connections, as well as the eventual destruction of residential and commercial properties. By the 1970s, planners and policymakers had accepted that building new highways devoted to the fast movement of motor traffic was not always the best answer to urban transportation issues.

The tremendous flood of inward migrating people into Pune has sparked an all-out dash for infrastructural upgrades. Many efforts are being made to improve road connections, parking, public transportation, power, waste management, water supply, and land planning.

Although Pune's participation in the Smart City initiative will undoubtedly alleviate some of these issues, the advantages would not be distributed evenly within the city's already limits. Urban planning authority's vision must be all-encompassing and participatory in nature. More consideration should be given in particular to the often-overlooked suburb regions that have yet to be incorporated into the city borders for a variety of reasons.

VI. CONCLUSION

Over the last 15 years, Pune has experienced tremendous industrial expansion. Rapid urbanization has put the city's transportation system under strain in recent years. Because of its dense population, the city's traffic needs cannot be handled only by a road-based system. The Pune Metropolitan Region's urban and regional planning development initiatives must be comprehensive and long-term. A focus towards Walking and cycling, in addition to taking public transportation, are frequently preferable options, not just in terms of pollution, but also in terms of speed. To alleviate traffic difficulties in Pune, a comprehensive traffic control infrastructure, as well as the correct enforcement of traffic regulations, is required. These should be targeted at developing compact cities with efficient transportation planning, as well as rehabilitating destroyed industrial regions and establishing new towns. Establishing a sustainable public transportation approach will aid in improving and transforming the city into a green city for a brighter future.

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