

## DYNAMICS OF POPULATION GROWTH AND URBANIZATION IN CHENNAI METROPOLITAN AREA

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**Abstract:** The paper attempts to study the trends in population growth and urbanization in Chennai Metropolitan Area and its constituent units by linking these with changes in land use planning and land transformation effected through Metropolitan Area Regional Planning to accommodate rapid increase in population due to in-migration of people to the city in search of employment and better civic amenities and facilities. In addition, an effort has been made to identify areas, which accommodated the major share of population and also the areas having potentiality to accommodate more population in near future.

For the purpose, the data/information available from various publications/documents/reports of Census of India, and Chennai Metropolitan Development Authority were calculated, tabulated, mapped and analyzed.

The study reveals that a large share of population has been accommodated in areas already having large population. It happened mainly because of changes made in land use planning, land use zoning plan, increase in floor area ratio, re-densification, height of the buildings, and land use transformation by the planning authorities.

**Keywords:** Master plan, Population Growth, Urbanization, Chennai Metropolitan Area, Development Regulation, Land Transformation

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### Introduction

Madras (now Chennai) is one the four major metropolitan cities in India, other three being Calcutta (now Kolkata), Bombay (now Mumbai) and Delhi. Located in the four different directions, these cities were controlling the economy, the trade and governance in their respective regions. During the colonial period, the former three being port cities were used to collect raw materials from their hinterlands for export to industrial centers of the master countries and to import finished goods for distribution. These port towns were well connected through the rail and road routes with their hinterlands. In most of the cases, there developed a radical pattern of transport network. These towns grew along transport routes in radial pattern. Chennai is the typical example of radical growth along the rail and road transport network.

In line with other metropolitan cities in the country, Chennai grew fast in post-Independence period. According to Census data, total population of Chennai Municipal Corporation (MC) area grew by more than thrice between 1951 and 2011: from 1.43 million in 1951 to 4.65 million in 2011. However, the physical expansion in municipal boundary of the city also contributed to some extent in this growth. The total area of under the Chennai MC, which was about 135 km<sup>2</sup> in 1961 increased to 175 km<sup>2</sup> in 2011. Nonetheless, it is phenomenal growth of population mainly contributed by in-migration of population not only from other parts of the state but also other states of India. Rapid increase in population took place between 1971 and 2001, growing from 2.57 million to 3.84 million. In-migrants came in

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search of better employment opportunities and civic amenities and facilities with expansion of industry, trade, commerce and administrative services. Local planning agencies played an important role in accommodating population coming to city on such a large scale. Notable, Tamil Nadu has a long tradition of town planning initiated with the visit of Sir Patrick Geddes to Madras (now Chennai) in 1916 (Town and Country Planning Organisation, 1997).

The planning authorities initiated efforts to plan Chennai City in the regional context by incorporating areas from the adjoining districts. Such an area unit was termed as Chennai Metropolitan Area (CMA), having geographical area of 1189 Km<sup>2</sup> and a population of 8.88 million, accounting for more than one-fourth (25.6 per cent) of total urban population of the state in 2011. The CMA comprises of the Chennai City Corporation, eight Municipalities, twelve Town Panchayats, and 179 villages grouped under the ten Panchayat Unions.

A new planning and development authority constituted for metropolitan regional planning is known as Chennai Metropolitan Development Authority. The planning authorities made various efforts to develop the City and its adjoining areas in a coordinating and harmonious manner. Important among these included the regularization of land use, and provision of basic infrastructural facilities along with having control on haphazard growth of population, settlement and economic activities. In addition, re-densification of already existing residential areas, change in floor area ratio and increase in height of buildings and changes in land use zoning were the other measures adopted (Chithra, 2013).

Taking a cue from the above statements, the present paper examines the trends in population growth and urbanization in different units falling under the Chennai Metropolitan Area (CMA) and linking these two with land use changes and land transformation effected through the planning process by the planning authorities.

#### **Objectives of the Study**

Following are the main objectives of the present study:

- (i) To study trends in growth of population taking place in CMA and its constituent units during 1971-2011;
- (ii) To link the population growth with land transformation and changes in land use effected by the planning authority; and
- (iii) To identify areas absorbing major part of the increased population, and areas potentials to absorb more population in the near future.

#### **Data sources and methodology**

The study is based on secondary sources of data/information such as Census of India, and Office of the Chennai Metropolitan Development Authority. These included *Primary Census Abstract*, Tamil Nadu, and *Town Directory*, Tamil Nadu for various Census years, available from the Office of the Registrar General and Census Commission of India, New Delhi; and different reports and documents available from the Office Chennai Metropolitan Development Authority, Chennai. The details of planning permissions issued by Chennai

Metropolitan Development Authority from 2009 to 2018 and the details of land use changes carried out by Chennai Metropolitan Development Authority from 1977 to 2018 were also pressed into service.

Available data/information was calculated, tabulated, mapped and analysis using appropriate cartographic and statistical techniques.

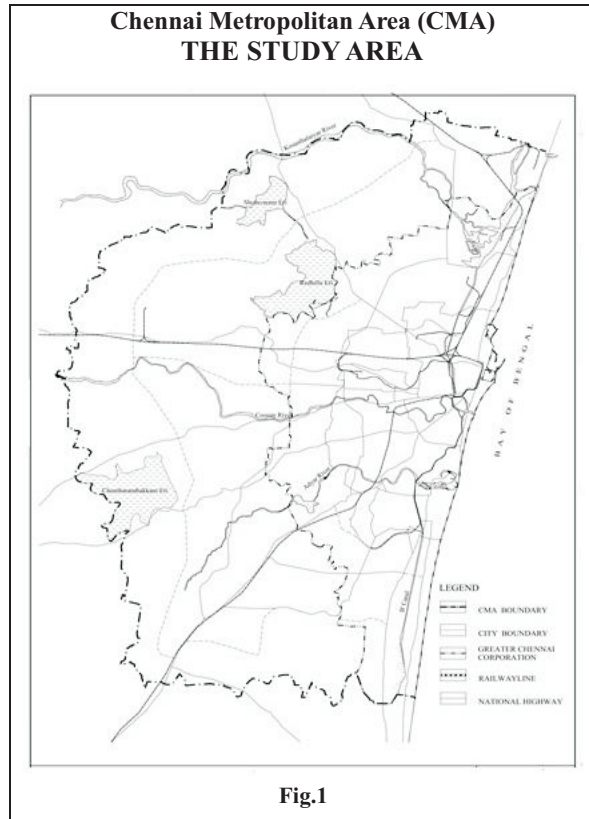
### Chennai Metropolitan Area: The study area

The Chennai Metropolitan Area (CMA) extends over 1189 km<sup>2</sup>, comprising of Chennai City, the eight Municipal towns, twelve Town Panchayats and 179 village Panchayats grounded under the ten Panchayat Unions (Table 1). The CMA covers the entire Chennai district and parts of Tiruvallur, Kanchipuram and Chengalpet Districts.

Table 1: Chennai Metropolitan Area (CMA): Details of constituent units					
I.	Municipal Corporation	III.	Town Panchayat	IV.	Panchayat Union
1.	Chennai	1	Chitlapakkam	1	Kattankulathur
		2	Kundrathur	2	Kunrathur
II	Municipalities	3	Madambakkam	3	Minjur
1	Anakaputhur	4	Mangadu	4	Poonamallee
2	Avadi	5	Meenambakkam	5	Puzhal
3	Pallavaram	6	Minjur	6	Sholavaram
4	Pammal	7	Naravarikuppam	7	St. Thomas Mount
5	Poonamallee	8	Peerkankaranai	8	Sriperumbudur
6	Sembakkam	9	Perugalathur	9	Thiruvallore
7	Tambaram	10	Thirumazhishai	10	Villvakkam
8	Thiruverkadu	11	Thiruneemalai		
		12	Thiruninravu		
Source: Office of the Chennai Metropolitan Development Authority; Note:179 Villages Panchayats have grouped under the ten Panchayat Union					

Chennai (then Madras) has a long history of growth and development. In 1639, it started as a small fishing port, but started to grow fast under the colonial impact (Buch, 1987). The Chennai City Corporation was constituted in 1798. In 1901, the city had an area of 68 km<sup>2</sup> and a population of 5.41 lakh persons. It has been growing fast after Independence both in area and population. Its area of about 135 km<sup>2</sup> and population of 1.75 million in 1961 increased to 175 km<sup>2</sup> and 4.65 million, respectively in 2011. After the conduct of census in 2011, boundaries of the Chennai Corporation were further extended to absorb the area and population of the seven municipalities, the three town Panchayats and the thirteen Panchayat Unions of Tiruvallur district and the two municipalities, the five Town Panchayats and the twelve Panchayat Unions of Kanchipuram district. As a result, Chennai Corporation area increased to 426 km<sup>2</sup>.

The urban form of Chennai metropolitan area has been dictated by developments along the main road corridors viz the grand Northern Trunk Road connecting Kolkata (NH5), and the Grand (Southern) Trunk Road (NH45) and the Grand (Western) Trunk Road that linking Bengaluru (NH4) along with the rail links radiating from the center of Chennai City (Fig.1). The rail corridors run in the north-west and south-west apart from the MRTS link along the Buckingham canal and the Metro rail corridors. A higher concentration of population has been observed in the southern and the western railroad corridors (CMDA, 2008).



**Trends in population growth, 1971-2011**

The trends in population growth during 1971-2011 have been examined by divided in CMA in two parts: (i) Chennai Municipal City, and (ii) Rest of the CMA. In 1971, population was mainly concentrated in Chennai City. Of the total population of 35.04 Lakh in CMA, Chennai City shared 26.42 lakh persons making more than three-fourths (75.4 per cent) in total. In 1981, Chennai City area population increased to 32.85 lakh person, registering an annual compound growth rate (ACGR) of 2.20 per cent during the decade (1971-1981). Against this, total population of the rest of CMA increased 13.16 lakh from 8.62 lakh during the same time, registering ACGR of 4.32 per cent, while the overall growth rate of CMA remaining 2.76 per cent during this period. Evidently, notwithstanding that population of the rest of CMA only about one-third of the total population of Chennai City area, it grew almost twice rate of population growth in Chennai City (Table 2). This can be explained by the two factors: (i) the base of population being large in the case of Chennai City, growth rate is low but total increase in population is still quite high, and (ii) in-migrants to Chennai City prefer to settle down in areas outside the Chennai City Corporation boundary for relative low housing rent in the areas in close vicinity of the City, and daily commuting to work place is possible due to increase in transport facilities.

Census Year	Chennai City		Rest of CMA		Total	
	Population	ACGR (%)	Population	ACGR (%)	Population	ACGR (%)
1971	26.42	-	8.62	-	35.04	-
1981	32.85	2.20	13.16	4.32	46.01	2.76
1991	38.43	1.58	19.75	4.14	58.18	2.37
2001	43.44	1.23	26.97	3.16	70.41	1.93
2011	46.46	0.67	42.38	4.62	88.84	2.35
1971-2011		1.42		4.06		2.35

Source: Census of India (2011). *General Population Tables, India, Table A -4.*  
Note: Population figures are in Lakh.

In 1991, when the total population of Chennai City area rose to 38.43 lakh persons, it grew at the ACGR of 1.58 per cent, much lower than growth rate earlier during 1981-91. This indicated to slowing down process in growth of population in Chennai City area. Against this, population growth rate in the rest of the CMA was 4.14 per cent, more than two and half times higher than that of Chennai City, but slightly lower than its own average growth rate earlier during 1971-81. It means the ACGR of population declined in both the segments of CMA during this decade in comparison to earlier 1971-81, but decline in ACGR was sharp in the case of Chennai City and only marginal in the rest of the CMA. Evidently, differentials in population growth rates between Chennai City and rest of the CMA further widened, indicating that the larger share population growth, which was taking place in CMA, is settling down in the rest of the CMA, outside the Chennai City Corporation limits.

This attributed to the major factors: (i) rapid increase of affordable and readily available vehicular transport, making commuting between Chennai City area and its hinterland in the CMA easy and faster, and (ii) planning strategies adopted by the Chennai Metropolitan Development Authority to absorb growing population in the rest of the CMA. These points will be discussed in details in the next section, where land transformation and land use changes in CMA have been examined.

In 2001, when the total population of Chennai City area went up to 43.44 lakh persons, its ACGR further declined to 1.23 per cent during 1991-2001, from 1.58 per cent earlier during 1981-91. The ACGR of population in the rest of the CMA area also declined during the same period, but it was nearly thrice that of Chennai City area, further widening the gap in population growth rates of the two segments of the CMA. It means the saturation level was approaching in the case of the Chennai City Corporation area, against larger potentialities to accommodate population in the rest of the CMA area.

In 2011, when the total population of Chennai City area increased to 46.5 lakh persons, its ACGR came down to less than one per cent (0.67 per cent) during 2001-11. Against this, population in the rest of the CMA recorded the highest ever growth rate of 4.62 per cent during the same period. During 2001-11, the rest of CMA recorded an absolute increase of 15.41 lakh persons in its total population, which was much higher than its total population of 13.16 lakh in 1981. This entire growth of population in the rest of CMA area can't be attributed to natural increase or in-migration or both, but there were some other factors contributing to such a phenomenal growth of population. During 2001-2011, there has been

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an increase of about 44.0 km<sup>2</sup> in the area of CMA and earlier during 1991-2001 an area of more than 200 km<sup>2</sup> was added to it. Against this, only one square kilometer area was added to Chennai Corporation area boundary during 1991-2011. Hence, among others, the jurisdiction changes effected during 1991-2011 in the outer boundaries of the rest of CMA area have also contributed significantly to phenomenal growth of population in this during the last two census decades, 1991-2011. To strengthen this argument further, it can be added that the municipal towns of Tiruvottriyur, Ambattur, Madhavaram and Alandur, registering high population growth during 2001-2011 were merged with rest of CMA. Similarly, the town panchayats of Kundrathur, Sembakkam, Mangadu and Thirunindravur along with St. Thomas and Kundrathur Panchayat Unions, again registering high population growth during this period, were amalgamated with CMA in 2011.

As stated earlier, there are different types of area units included in CMA. In 2011, more than half or 52.3 per cent of total CMA population was residing in area falling under the Chennai Corporation. Another more than one-fifth or 22.8 per cent was residing under the Extended Chennai Corporation. In other words, three-fifths of total population of CMA was residing under Chennai and Extended Chennai Corporation areas (Table 3). The remaining one-fourth was distributed among three remaining units in the following manner: Municipalities (11.1 per cent), Town Panchayats (4.6 per cent), and Panchayat Unions (9.2 per cent). It is to be noted here that 179 villages falling under the jurisdiction of MCA have been grouped in ten Panchayat Unions for rural administration (see for details Table 1).

Constituent unit name	Population (in lakh)	% in total
Chennai Corporation	46.46	52.30
Extended Chennai Corporation	20.29	22.84
Municipalities	9.83	11.06
Town Panchayats	4.11	4.63
Panchayat Unions	8.15	9.17
<b>Total</b>	<b>88.84</b>	<b>100.00</b>

Source: As of Table 2

Briefly, there has been rapid growth of population in and around Chennai City Corporation limits during the post-Independence period, mainly due to in-migration of persons and their families looking for better employment opportunities and civic amenities and facilities. During 1971-2011, annual compound growth rate of population was the highest during 1971-81 decade and the lowest during 1991-2001. Throughout the entire period, population growth rate in areas adjoining to the Chennai City Corporation limits, termed as the rest of the CMA, has been twice or more than that of the Chennai City Corporation area. Population growth rate in the rest of CMA has been the fastest during the latest census decade (2001-11), contributed not only by in-migrant population but also by the jurisdictional changes in its boundary. Notwithstanding this, growth rate of population in the rest of the CMA area has been twice or more than that of Chennai City area during the entire study period (1971-2011).



### Growth and Development of CMA: Master Plans

In the following, an attempt has been made to evaluate the planning strategy adopted by the Chennai Metropolitan Development Authority (CMDA) to regulate land use planning and land use zoning plan to accommodate population and regulate the development within the Chennai City Corporation boundaries and other parts of Chennai Metropolitan Area (CMA).

CMDA has prepared and implemented the two Master Plans for the regulated and harmonious development between Chennai City and its hinterland. The First Master Plan (1971-2008) came in operation in 1971. The Second Master Plan (2008-2026) came in force from September 2008.

In fact, the Master Plan, one of the important statutory documents prepared to facilitate and encourage the optimal growth of dominant functions of urban areas along with strengthening the intra-urban linkages and providing an elbow room for spatial growth, is prepared under the Town and Country Planning Act for laying down the basic framework for guiding and regulating the future growth of an urban area (Nallathiga, 2009). A Master Plan primarily consists of three basic instruments: (i) a zoning plan, determining the use of each land parcel in the development area, (ii) road network plan, guiding the provision of trunk infrastructure, and (iii) development control regulations, determining the built form in the development area.

The main objective behind the planning strategy adopted by the CMDA in the Master Plans has been to regulate developments in an orderly manner along with providing the necessary land use pattern to accommodate the demand for developments in context of population growth. The major initiative that would influence the urban form of Chennai Metropolitan Area including major road infrastructure projects viz formation of the IT corridor, extension of NH Bypass and the formation of Outer Ring Road, Strengthening of the Suburban railway infrastructure, extension of the Mass Rapid Transit System and the proposed implementation of Metro Rail corridor were considered in the preparation of the Second Master Plan (2008-2026).

Land use Type	Chennai City		Rest of CMA	
	Area (in hectares)	% to total	Area (in hectares)	% to total
Residential	9523	54.3	22877	21.9
Commercial	1245	7.1	390	0.4
Industrial	908	5.1	6563	6.3
Institutional	3243	18.4	3144	3.0
Open Space & Recreation	366	2.1	200	0.2
Agricultural	99	0.6	12470	11.9
Non-Urban	82	0.5	2433	2.3
Others*	2087	11.9	56507	54.0
<b>TOTAL</b>	<b>17,553</b>	<b>100.0</b>	<b>104,584</b>	<b>100.0</b>

Source: CMDA: *Second Master Plan for CMA, 2008-2026*

\* including vacant land, forest, hills, low lying areas, water bodies etc.,

The land use existing in 2006 presents a contrasting picture between the Chennai City and the rest of CMA. With more than half (54.3 per cent) of its total area under the residential use, Chennai City is the densely populated area against rest of the CMA having only more than

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one-fifths (21.9 per cent) of its areas under the residential use (Table 4). On the other side of the scale, land falling under 'others' category, including the vacant land and forest area also, was more than one-half (54.0 per cent) in the rest of the CMA area, against only about 12.0 per cent in Chennai City area. Evidently, while Chennai City was a densely populated area, the rest of CMA was full of future potentialities for residential and other developments. However, very little land area under open spaces and recreational sites was a matter of serious concern in the case of the rest of CMA.

Land use zone type	Chennai City		Rest of CMA	
	Area (in hectares)	% to total	Area (in hectares)	% to total
Primary Residential	5916.35	33.6	32090.7	31.7
Mixed residential	2426.90	13.8	13503.1	13.3
Commercial	714.24	4.0	880.3	0.8
Institutional	2868.97	16.3	3888.8	3.8
Industrial	691.83	3.9	7274.3	7.2
Special & Hazardous industrial	130.67	0.7	3416.1	3.4
Open Space & Recreation	1000.65	5.7	392.9	0.4
Agricultural	-	-	7295.8	7.2
Non-Urban	113.31	0.6	2332.9	2.3
Urbanable	-	-	2075.9	2.0
Others*	3754.79	21.3	28147.6	27.8
<b>TOTAL</b>	<b>11617.70</b>	<b>100.0</b>	<b>101298.4</b>	<b>100.0</b>

Source: CMDA: *Second Master Plan for CMA, 2008-2026*

\* including roads, forest, red hills, catchment area, water bodies etc.,

A comparative examination of existing and proposed land uses makes an interesting story (see Tables 4 and 5). It proposes to bring in near parity in shares land under residential use between Chennai City and the rest of CMA. Other the other side of the scale, there is a proposal to bring down the share of land under industrial use in the Chennai City from 5.2 per cent in 2006 to about 4.0 per cent by 2026. Against this, there is a proposal to increase the share of industrial use to 7.2 in the rest of CMA from 3.0 per cent during the same time. By 2026, the land under 'others' category is proposed to reduce to about 28.0 per cent from 54.0 in 2006, but there is proposal to increase the share of such land by more than twice in Chennai City. It will be interesting to see whether the CMDA will be able achieve its projections.

In this context, it will not be out of the context to have a cursory look at the objects set by the CMDA for spatial plan during the Second Master Plan (2008-2026). The five main objectives are: (i) optimum utilization of land by channelizing the developments in the right directions and locations; (ii) the future land needs of the metropolitan area by recognizing the existing growth trends and strengthening the infrastructure links needed, (iii) efficient transportation network integrating work, living, shopping and recreation areas to arrive at balanced developments, (iv) wider scope for decentralized employment locations and economic development, and (v) preservation and conservation of ecologically sensitive areas and natural and built heritage (CMDA 2008).



In the following, a brief examination has been made of the spatial planning objectives and strategies in the physical form.

(i) **Mixed land use zoning:** The concept of mixed land use zoning has been prevalent in Chennai City since 1975 and has remained continue so far. A new zoning term, the urbanisable zone, has been coined in the 2<sup>nd</sup> Master Plan; this zone facilitating the most environmentally safe urban uses paving the way for demand driven developments-without affecting the quality of life in the neighbourhood (CMDA, 1975; 2008).

(ii) **Development regulations:** The development regulations formulated as part of the 2<sup>nd</sup> Master Plan for CMA incorporated population projections and revised to promote development in conformity with zoning regulations and the desired urban structure. Source of the key components of development regulations included permission to: multi-storied buildings outside the city; (ii) IT buildings in more zones; (iii) higher Floor Space Index (FSI) for developments in MRTS influence Area to promote Transit Oriented Development; (iv) induce Transfer of Development Rights in cases of road widening and other public infrastructure projects, and (iv) promote lower income group housing by allowing more FSI.

#### **Planning permissions issued by categories**

CMDA has been implementing the development regulations since 2008. In the process, it has been issuing permission for certain categories of developments. For example, all developments exceeding six dwelling units and an area of 300 m<sup>2</sup> along with is more than Stilt plus two floors in commercial zones were asked to obtain Planning permission from CMDA; the criteria got revised with the implementation of the Tamil Nadu Common Development and Building Rules, 2019. The parameters of development regulations were revised to be more flexible so as to promote denser developments. An examination of permissions issued by CMDA for various categories of development during 2009-2018 is highly revealing. In all, 4,530 permissions were issued during this period giving an average of 453 permissions per annum. The highest number of 3323 permissions, making nearly three-fourths of total, was issued for special buildings (residential uses) followed by the special buildings (commercial & other uses) with 664 or about one-seventh of total permissions; both in combine receiving about nine-tenths of all permission (Table 6). Special buildings refer to buildings with less than five floors and Multi-storied buildings refer to buildings with more than five floors and it is also observed that special buildings are more in number while compared to Multi-storied buildings. The buildings constructed by the Tamil Nadu Housing Board and Tamil Nadu Slum Clearance Board are also covered in the planning permissions.

The basic objective was to bring safety, security, health and convenience along with economy in the functioning of different land use zones.

In terms of the distribution of permission by different year, the maximum number of 604 permissions was issues in 2003, which is mainly attributed permissions for residential areas.

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On the whole, first five years during 2009-2018 received permissions higher than the annual average of 453 permissions, while the reverse was true for the latter five years.

Year	Details of permissions issued					Total
	Special building		Multi-storied building		Total	
	Residential	Commercial & other uses	Residential	Commercial & other uses		
2009	365	72	20	12	469	
2010	441	82	19	51	593	
2011	374	52	17	17	460	
2012	441	90	38	30	599	
2013	453	75	31	45	604	
2014	246	44	21	26	337	
2015	290	45	41	17	393	
2016	239	42	39	20	340	
2017	278	84	21	27	410	
2018	196	78	19	32	325	
<b>Total</b>	<b>3,323</b>	<b>664</b>	<b>266</b>	<b>277</b>	<b>4,530</b>	

Source: As table 5

The number of planning permissions is an indirect indicator for measuring the trends of development and it is the density of development that is actually a direct indicator. Even though the actual number of planning permissions may be less, the number of dwelling units or the commercial space covered in such planning permissions may be much more depending on the intensity of development. Further the various local bodies with Chennai Metropolitan Area including the Greater Chennai Corporation have been delegated with necessary powers to issue planning permissions for certain categories of development and the local bodies account for a large share of planning permissions in Chennai Metropolitan Area.

An analysis carried out to identify areas having greater development potential reveals that Koyambedu, Mangadu, Velachery, Zamin Pallavaram, Ambattur, Alandur, Kottivakkam are areas where large scale developments have been approved. This indicates in these areas higher increase in population growth necessitated the need for providing housing and other facilities to accommodate the increased population, demonstrating their higher potentiality for development.

### Land use changes in CMA

Before moving directly to changes effected by the CMDA, we have brief discussion on land use zoning, the first step in the direction of land use planning with serious implications. Done to maintain public safety, security, convenience and tranquility, zoning separates the non-conforming land uses from each other, e.g. residential areas from the industrial areas. It helps in preservation of open space, prime agriculture land and ecologically sensitive areas also. However, land use zoning prevents the optimum development of a particular site, when the site is zoned for more than one land use zone; expansion of existing activities is also curtailed due to non-confirming land use zone; and the sites zoned for open space, recreational use and institutional use are not put to use as these sites are not acquired by the Govt., making hardship to the owners of such lands.

However, the demand for developments is market driven. In order to provide the necessary right to change the land use classification, as stipulated in the Master Plan, Sec.32(4) of the Act (see Govt. of Tamil Nadu, 1973), provides for reclassification of one to other category of land use. Landowners apply for reclassification and such requests are examined and decided on individual merits in accordance to the provisions of the Act. The provision for reclassification enables flexibility in land use zoning by catering to the demand created by large-scale urbanization on the provision of housing and other facilities.

Information on the number of changes made in land use during 1977-2018 has been presented in table below (see Table 7). These changes were effected following the due procedures for reclassifications ever since the First Master Plan for CMDA came into operation from August 5, 1975. Changes have been classified based on administrative jurisdiction to understand the trend in terms of growth in population in the respective constituent units i.e., city Municipalities, Town Panchayats and Panchayat Unions and an attempt has been to correlate the growth of population and the changes in the land use pattern.

Year	Chennai City	Municipality	Town Panchayat	Panchayat Union	Total
1977-81	3	11	5	3	22
1982-86	113	40	99	114	366
1987-91	90	24	54	196	364
1992-96	101	42	51	128	322
1997-2001	92	13	37	120	262
2002-2006	46	15	44	116	221
2007-2011	62	25	20	114	221
2012-2018	111	34	20	109	274
<b>TOTAL</b>	<b>472</b>	<b>148</b>	<b>291</b>	<b>712</b>	<b>1623</b>

Source: As table 5

In all, 1623 times land use changes were effected during 1977-2018, giving an annual average of about 41 changes per annum. The minimum number of changes was during 1977-81 and the maximum number during 1982-86. Among the constituent units, village panchayats accounted for the maximum number of 712 changes, making about 44.0 per cent the total reclassifications. Since the vast vacant lands were available for development further the availability of sub-urban rail transport both towards north and south direction in the Metropolitan Area has facilitated the movements of the population leading to demand.

On the whole, the period between 1982 and 1996 witnessed the largest number of land use changes. During this period, as many as 1,052 changes made, make about two-thirds of all changes during 1977-2018. It was during this period that large scale construction of flatted developments was undertaken within the Metropolitan Area. The expansion of Chennai Corporation rectified the increase in reclassification of land from agricultural to Residential and other uses of land to accommodate the needs of the population. The period from 2012 to 2018 witnessed again an increase in the number of reclassification of land use.

An attempt has also been made to identify the land use categories, which has undergone the maximum number of reclassifications during 1977-2018. It is evident from Table 8 that land

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use changes are predominantly carried out from Agriculture use zone accounting for about 46.0 per cent of the total reclassifications. Among the uses to which the agriculture use zone has been changed, the residential category is at the top with more than two-thirds or 67.0 per cent of the changes. This indicates that there has been a greater effort to accommodate the housing needs of the increasing population especially in the peri-urban area. The next land use category that subjected to the large number of changes is the primary residential use zone, being converted into mixed residential and commercial use zones. Which was done to accommodate the growing demand for the commercial activities?

**Table 8: CMDA: Number of land use reclassification (transformation) by use categories, 1977-2018**

From/ To	Residential		COMM	INDL	S&H	INST	OS&R	AGRI	NU
	PR	MR							
PR	6(EWS)	278	134	103	13	95	3	14	
MR	8	-	18	31	2	4	-	6	
COMM	4	-		10	-	-	-	-	-
INDL	41	7	3	1	1	6	1	6	-
S&H	5	5	2	2	-	2	1		-
INST	100	26	19	11	-	-	4	2	-
OS &R	63	14	12	30		8	-	6	-
AGRI	622	38	28	167	11	45	8		17
NU	21	3	6	4		6	-	-	-

PR=Primary Residential, MR=Mixed Residential, COMM=Commercial, INDL=Industrial, S&H=Special Hazardous, INST=Institutional, OS&R=Open space and Recreational, AGRI=Agriculture, NU=Non-Urban

Source: As Table 5

The change from residential use to mixed residential and commercial use is observed in Chennai city and the surrounding municipalities, where more than three-fifths or 63.0 per cent of the land use changes are from 'primary residential' use zone to 'mixed residential' and 'commercial' use zone. Substantial reclassification to industrial uses have also occurred which reflects in the increase of industrial developments including large scale manufacturing in automobile sector. Lands earmarked for 'open space and recreational' use zone has also been changed to 'residential and commercial' use zones to a certain extent. Generally, it is observed that in most of the cases the place moved the lower order use zone to the higher order use zones.

#### Conclusions

An examination of growth of population in CMA and the planning permissions and reclassification issued by CMDA reveals that the areas identified with higher growth rate of population are also the areas of higher potentials for residential developments to accommodate the housing needs of rapidly growing population in and around Chennai City.

The development regulations forming part of the Master Plan provided adequate flexibility for taking up large-scale developments with more intensive use of land. The newly added Municipalities and Town Panchayats to the extended Greater Chennai Corporation are fast growing urban centers, identified as the areas with greater development potential for their close proximity to the core city. The process of reclassification has increased the availability

of land for residential and other uses and the conversion from 'agriculture use zone' to 'residential use zone' in the outlying areas within CMA. While the change of use from residential to commercial and other higher order uses has been observed in the core city and extended areas of Chennai City Corporation Area.

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