

## Introduction

- World Urbanization reached 55 percent in 2018 while it is projected to reach 68 percent by 2050.
- India's urban population grew from 27.86 percent to 31.16 percent during 2001-2011
- Urban agglomeration and towns has grown very rapidly in India from 1827 in 1901 to 7935 in 2011
- Mega cities continue to emerge across the Country due to rapid urbanization.
- Urban growth factors like natural increase of population, in-migration playing key role for urban growth.
- Urban growth modeling become an advance tool to plan and manage the system of urban unit
- Metropolitan cities growing rapidly due to rapid rural to urban migration.
- Census defined urban area changes because of continuous growth.
- Large expansion in major and minor cities.
- City expansion or urban sprawl or excessive city growth needs to be understood
- While use of Remote sensing and GIS is very important.
- Growth modelling of cities also become very necessary for that.

## Need for the Study

- Mumbai is one of the largest mega city as well as largest urban agglomeration in India. It comes under Mumbai Metropolitan Region (MMR), a planning region in India.
- Though several studies attempt to capture the urban growth phenomena but Indian cities still strong needs exist to examine urban growth dynamics because city is ever changing.
- Studies shows that Mumbai city has experienced a fastest outer growth in recent time.
- Though urban growth in Mumbai is well accounted at city level by many research scholar but it is never studied as regional basis though policy programmes are implemented at regional scale. So this study has been conducted to dig more information.

## Objectives, Data and Methods

### Objectives:

- To examine the changing demographic characteristics of MMR from 1971 to 2011.
- To show the volume and changing pattern of migration in MMR
- To examine the changing land-use pattern and urban expansion in MMR during 1991-2020
- To predict future urban growth for the year 2030 and 2040.

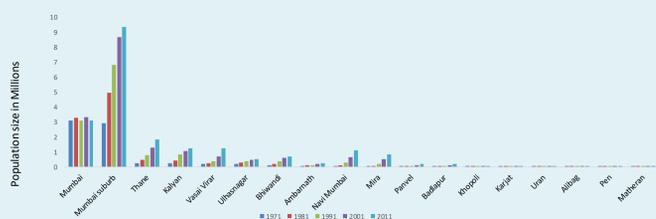
### Data Source:

- Population and Migration data from Census of India 2001 and 2011.
- Remote Sensing data from Landsat Series like Landsat 5, Landsat 7 and Landsat8

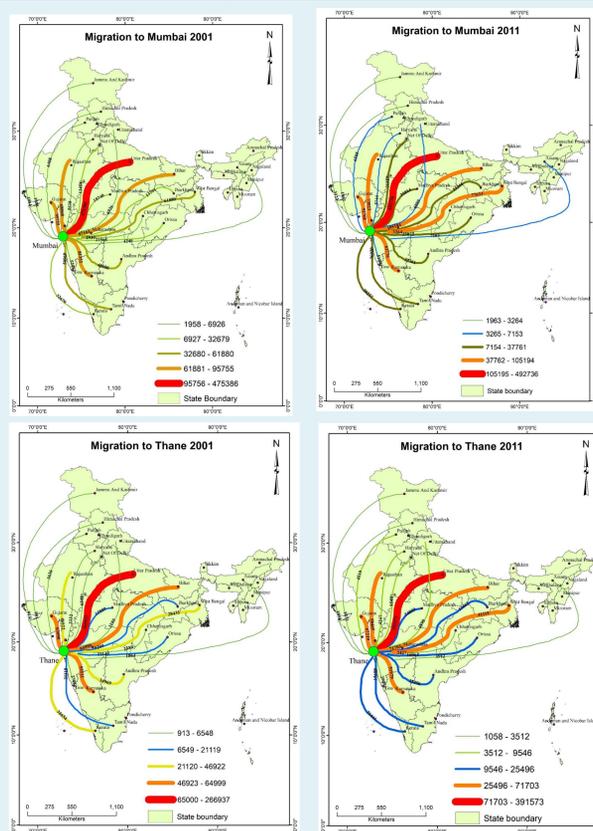
### Methods:

- Density Gradient
- Mean Centre Analysis
- Land use and land cover map
- Maximum Likelihood Supervised Classification
- Markov chains-cellular automata model

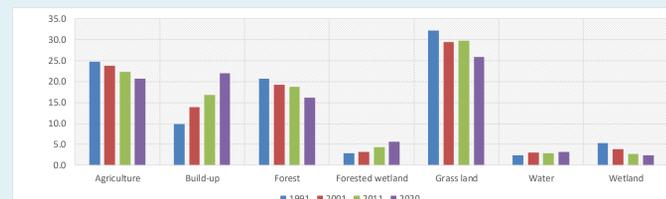
## Change in Population Size



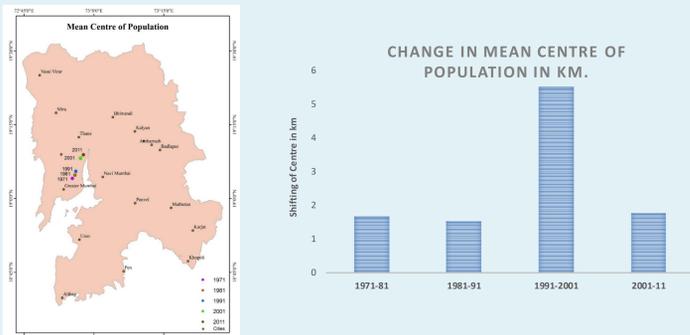
## Change in Volume of Migration in Mumbai and Thane City in 2001 and 2011



## Percentage Share of Land-use In 1991 to 2020

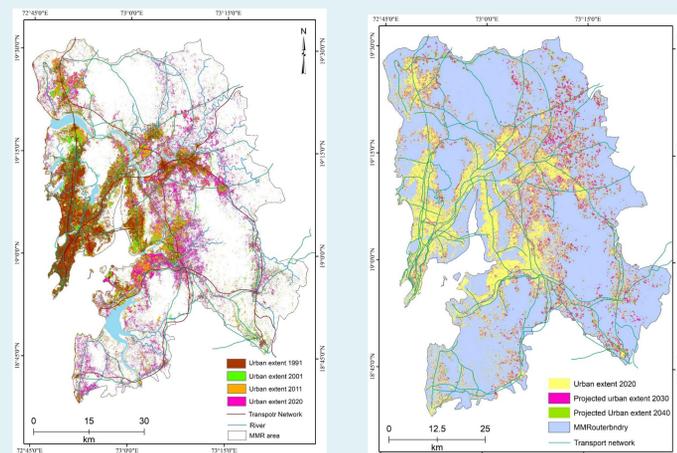


## Change in Mean Centre and Population Density Gradient

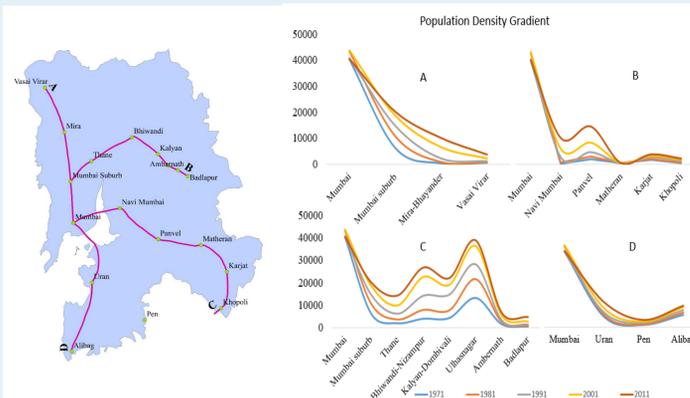


Population growth and Build-up growth in MMR					
Year	Build-up area	Period	Build-up growth rate	Population (million)	Population growth rate
1991	431	1981-1991	-	14.6	-
2001	607	1991-2001	40.77	19.4	33.1
2011	738	2001-2011	21.68	22.8	17.8
2020	964	2011-2020	30.56	-	-
2021* (Projected)	-	2001-2021	-	26.5	16.3

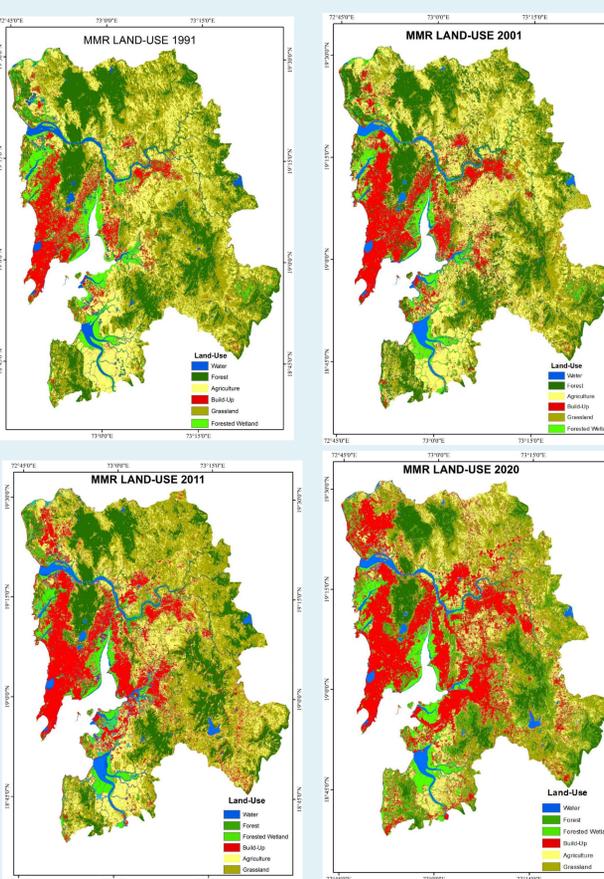
## Built-up Area Expansion during 1991-2020 and Predicted Built-up Area for 2030 and 2040



Year	Build-up area (Sq. Km)	Percentage of total land
2020	964	22.0
2030	1148	26.3
2040	1201	27.5



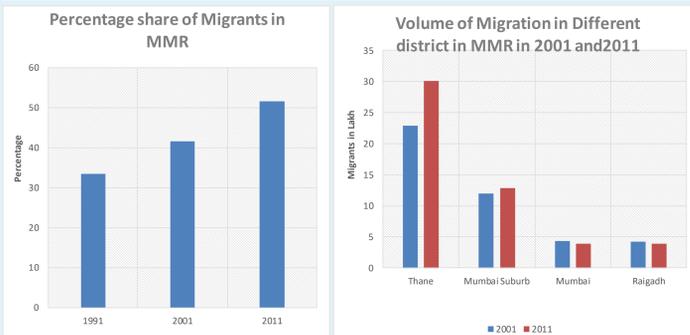
## Land use and land cover change during 1991 to 2020 in Mumbai Metropolitan Region



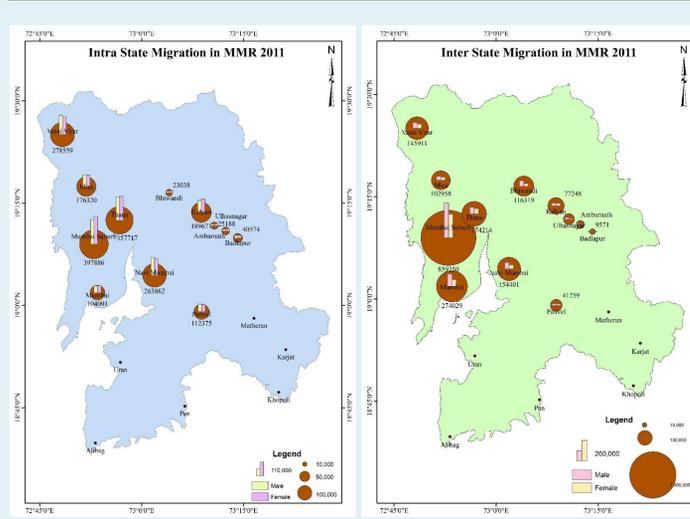
## Absolute area of different Land-use, percentage

Year	Build-up	Water	Wetland	Forest	Forested wetland	Grass land	Agriculture
1991	431	108	234	906	128	1408	1081
2001	607	135	167	844	139	1289	1038
2011	738	127	115	821	192	1306	978
2020	964	143	102	710	245	1134	909

## Change in Migration Pattern in Mumbai Metropolitan Region



## Pattern of Intra-state and Inter-state Migration in MMR



## Conclusion

- Demographically MMR region is very vibrant in nature and it has redistributed its population over the time from core to outwards
- As a result the gravity centre mean of population is Changing towards Thane city as population redistributed.
- While the main factor affecting rapid population growth in this area is in-migration from the rest of the country
- Mumbai urban agglomeration is one of the largest and very fast growing urban regions in the world, and it is influenced by growth of population and urban expansion in this region
- Land-use has been changed drastically during this time.
- Urban area in this region has grown from 10 percent to 22 percent of total area and growing overall 124 percent increase during last three decade
- urban growth dynamics are strongly linked with population growth of MMR region
- The predicted urban area in 2030 and 2040 will account 26.3 percent and 27.5 percent of total area respectively
- The direction and pattern of future urban growth can be examined by the policy maker to maintain the sustainability of this region.