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Selected issues and challenges of Bangalore metropolitan — A critical analysis

R Hanumantharaju¹, Ashok D Hanjagi²

¹ Research Scholar, Department of Geography, Bangalore University, Bengaluru

² Professor and Chairman, Department of Geography, Bangalore University, Bengaluru

Abstract

Since about the year 2000, more than half of the world's population lives in urban or highly urbanized areas (Swanson, 2007). An urban environment is the region surrounding a city. Most inhabitants of urban areas have non-agricultural jobs. Urban issues and challenges are grouped under two broad categories. Firstly, internal problems affect the city area and its inhabitants; and secondly, the external issues that impact the area and people on its fringe area or umland. Bengaluru is the second-fastest-growing city in Asia. Today Bengaluru is facing many issues and challenges because of the fastest growth of Urbanization. Bengaluru has a vast number of opportunities in terms of employment, education, investment, and favorable climatic conditions attracting people from various places. This research paper aims to crucially analyse the selected issues and challenges of Bangalore Metropolitan. The data for the research has been obtained from spatial and non-spatial data sources. Secondary data have been used to write the research papers. Geospatial technology has used to prepare the maps.

Keywords: Issues; challenges; metropolitan

Introduction

“Settlements as an occupancy unit represents an organized colony of human beings including the buildings in which they live or work or store or use them otherwise and the tracts or streets over which their moments take place” (R. L. Singh, 1961). Before forming settlements, human beings were nomads and tribes across the land; they searched for food and water. The main reasons for establishing human settlement are religious, cultural, military, economical, and political. People in a group start to be involved in agricultural, forestry, mining and fishery activities. The population and spatial size

settlements have several forms like hamlet, village, town, city, metropolitan city, megalopolis and conurbation.

Many small towns and bigger villages are well linked with its main city located in the center, making the whole region more complex and it is challenging to comprehend and delineate the urban boundary. It is due to the linkage of the non-agricultural activities with agricultural activities and urbanites with villagers.

Global trigger factors for urbanization are demographic change, economic change, social change, cultural change, technological change, environmental

change and political change. These triggers lead to the process called urbanization, reurbanization, counter urbanization, exourbanization, suburbanization and peripheral urbanization.

Urban issues and challenges are grouped under two broad categories. Firstly, internal problems affect the city area and its inhabitants; and secondly, the external issues that impact the area and people on its fringe area or umland. In Asia, Bengaluru is the city with the highest growth rate as well as rapid growth of urbanization. Kempegowda built Bengaluru city has grown faster in geographical area within a span of 70 years. The city faces many problems because of urbanization, globalization, and privatization; this is the reason behind selecting the present research topic. At the same time, Bengaluru is facing a wide range of issues and challenges to its future growth and prosperity from issues such as climate change, water scarcity, urban flood and damage to important natural habitats, women security, solid waste management, inhabitants for poor, reduction in the green area, land acquisitions, lake encroachment, traffic, and urban crime. If left unchecked, these issues and challenges could place a significant break on future economic growth and improvements to its residents' quality of life.

However, Bengaluru has an opportunity to address these issues and challenges as part of its growth aspirations by looking at actions it can take now to future proof its growth and development. Some cities have vertical growth and some are horizontal growth, but cities like Bengaluru show a circular increase. Now it has become a pleasure to study its issues and challenges of the study area for growth and its potential to raise the standard of living of people and sustainable development of Bengaluru City.

Study Area

For these researches Bangalore Metropolitan has been selected. Bangalore urban area growth is remarkable; we can identify many changes since Kempegowda period to till date. Bangalore lies in the southeast of the South Indian State of Karnataka. The city is in the heart of the Mysore Plateau, (a region of the larger Precambrian Deccan Plateau) with an average elevation of topology of Bangalore is flat except for a central ridge. The highest elevation point in city area is Doddabettahalli, which is 962 mts high. Bangalore is one of the smallest districts in Karnataka in area of 2190 sq. km.

Population is the most important factor for all the phenomena; it is related in all the respect in the entire field. The growth of the population clearly shows the changing trends in the field of the urbanization. Bangalore is the third most populous city in India and the 27th most populous city in the world. In India, Bangalore is the fastest growing metropolis after New Delhi. As per 2011 census data, the population of the study area is 8425970 with density is more than 11371 persons per sq. km. The spatial and temporal

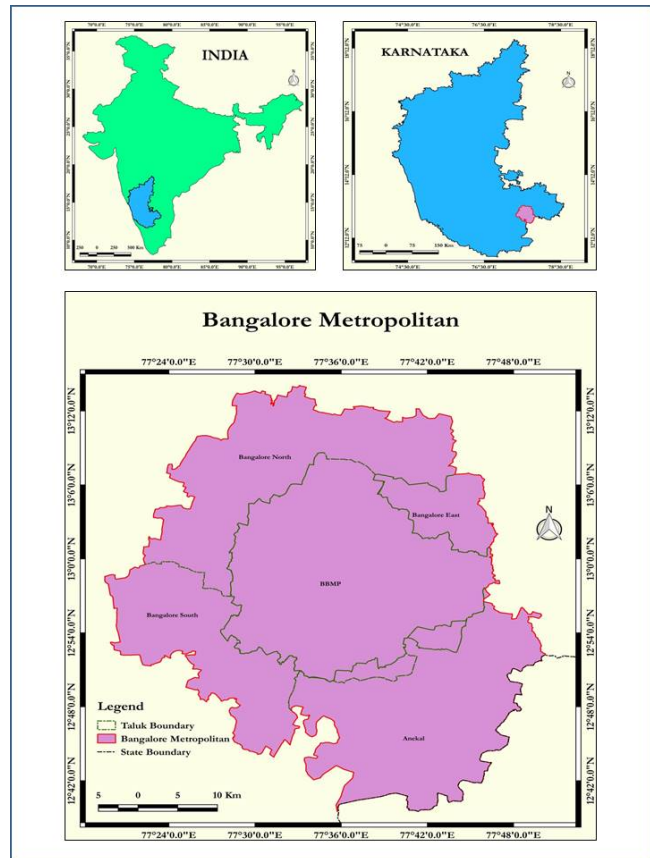


Fig. 1. Location map of study area

growth of Bangalore city is remarkable when compare with the Indian cities and cities in the world.

Objectives

The major objective of the research paper is to critically analyse the selected issues and challenges of the Bangalore Metropolitan.

Data Collection

For the research primary and secondary data obtained from different sources like Topomap, BBMP, BDA, Government District Gazetteers of Bengaluru Urban District, leading News Papers, and sampled field surveys have been done to get Primary data.

Methodology

Geo-spatial technology is used to process spatial and non-spatial data. Arc GIS 10.4, ERDAS Imagine and open source have been used here for processing, analysing and constructing maps.

Table 1. Highlights of master plan of BMA

Master Plan	ODP		1st CDP		2nd CDP		3rd CDP	
Plan period	1961-1976		1984-1995		1995-2005		2005-2015	
Local Planning area (sq.km)	500		1306		1306		1306	
Area for Development	264	52.8%	440	33.7%	564	43.2%	891	68.2%
Green Belt and Agricultural Area	236	47.2%	866	66.3%	742	56.8%	415	31.8%

Source: Revised Master Plan for Bengaluru- 2031(Draft): Volume-1

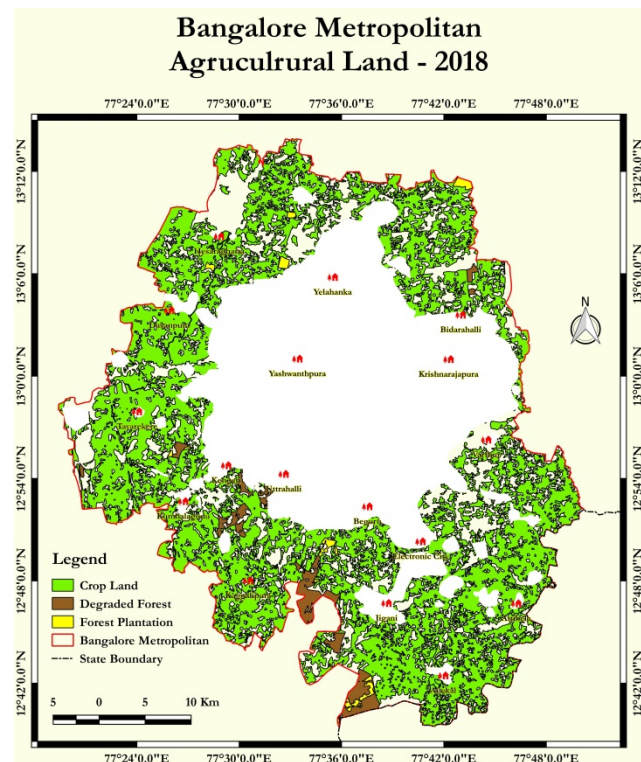
Discussion

In the 3rd Comprehensive Development Plan (CDP) 2005-2015, out of 1306 sq.km, an area of nearly 415 sq.km or 31.8% of the Metropolitan Planning area is designed as a green belt where an area of 891 sq.km or 68.2% of the metropolitan planning area is designed for area development.

Agricultural Land: The most common and the most debatable measure to check the excessive growth of a city, which has been used in the United Kingdom, India and many other Common Wealth Countries, is creating a Green Belt around the city. Postulated by Ebenezer Howard in the 1910s, the green belt concept was applied to London to stop its disorganized overgrowth. Howard sought to relieve London's extreme congestion and restrain its further growth by proposing a green girdle around it and building beyond it several 'Garden Cities'. The Green Belt is essentially a land area, predominantly agricultural in use, notified around merging neighboring towns and preserving the city's unique character. The Garden City was defined as a city limited and moderated in size, self-contained and designed for healthy living and working. The idea found its application in London and many other cities; Singapore, Tokyo, Delhi and Stockholm, to name only a few. Almost all the comprehensive development plans of major cities in India have adopted this planning principle to restrain their growth.

The Green Belt concept is sound, but its enforcement is difficult, as it is a restrictive instrument. Real estate developers, vested interests and pressure groups frustrate town planners and decision-makers' efforts to preserve the green belt. In Indian cities, a clear-cut statement of the green belt's objectives is missing from land-use zoning regulations. Moreover, the green belt and ring town beyond the green belt are not simultaneously created.

It is necessary to preserve this as a Green Girdle by large-scale tree planting and location of recreation facilities, agricultural research stations, vegetable gardens, nurseries, dairy farms, poultry establishments and other related land uses. Farm Houses, luxury villas, industrial workshops and the like should not be permitted. The green belt area should also be brought under the preview of the Urban Land Ceiling Act of 1976. It is also essential to preserve the green belt eco-system by using social forestry, preventing pollution of

**Fig. 2.** Bangalore metropolitan agricultural land - 2018

streams flowing through the green belt and maintaining the existing tanks or water sheets. Plants help purify water and air in many ways and make the green belt a sink for air pollutants. Finally, it must be stressed that the green belt's success depends greatly on the state and local authorities to the concept of green belt and the government's sagacity at all levels not to succumb to political interference and pressures by vested interest.

Water Body: Water bodies mainly cover by tanks, lakes and streams. Bangalore Metropolitan Region is an eye witnessing the encroachment of many tanks and lakes. Within the span of the last 50 years, the Bangalore Urban district area was lost more than 50% of water bodies. After 2000 Lake Development Authority took care of these water bodies in the city region and as well as in the outskirts. Some lakes are privatized

and some renovated by the local governments. At present, the majority of Bangalore lakes and tanks are ruled by the wastewater from the industries and households.

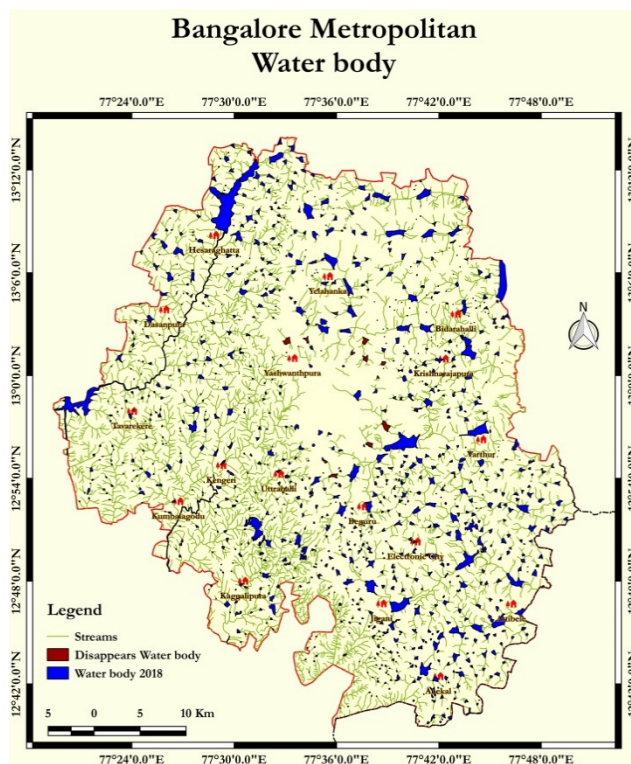


Fig. 3. Bangalore metropolitan water body - 2018

Bangalore city and Urban District is divided into three major valleys: Vrishabhavati valley, Hebbal Valley and Koramangala and Challaghatta Valley. These are interlinked with the many tanks and lakes of the metropolitan area.

More than 70 percent of the earth's surface, which is covered by water, exerts a great influence on man and his activity. No matter what the environmental conditions exist on the planet, there is life if there is water. Water is most essential for the growth and development of men, animals and plants, and is also a basic need for sustainable economic activity. Surface water resources have played an important role throughout history in the growth and development of human civilization. But, these sources also serve as the best sinks for the discharge of domestic as well as industrial wastes. This unscientific disposal of garbage has created immense problems for human being and to the aquatic environment worldwide (Das and Acharya, 2003)

Water availability depends on location and time due to geographical, climatical and physical conditions. Through advanced technologies, water can be conserved and utilize efficiently for sustainable progress. According to the international lake environment committee report (ILEC 2007) lakes are considered a combination of standing water and flowing

system. They usually have both inflow and outflow channels, giving the water system a unique characterization.

Bangaluru had surface water bodies at the beginning of the urban expansion and was effectively collecting the precipitated water. Natural topographical features interlinked all the tanks and lakes. With continuous and fast developments, many tanks have disappeared. The city needs a proper drainage plan. Many storm water drains leading to the city's four major valleys are not covered on the top and are a nuisance to the neighborhood, causing mosquito-breeding and foul smell and recently due to chemical reaction fire also accruing in storm water.

Covering such drains with concrete or stone slabs is costly and not practicable because of wide spans. Hence, cheaper types of large pipes with appropriate man-holes at intervals could solve nuisance and may even become welcome spots if the top is cushioned with 2 to 3 feet of earth to permit grass and flower plants' growth. This also separates the sewage from stormwater, in which the present open drain system is getting polluted at many places.

Drastic Changes in LULC: Land Use and Land Cover is a dynamic phenomenon; there are many reasons and causes to change the land use and land cover pattern in any region. Bangalore is also evidencing the drastic change in land use and land cover patterns. The core Bangalore and the outskirt of the city regions changes at different rates. The maximum conversion took place in the fringe, peri-urban and transaction zone than the central business district. Overpopulation, urbanization, modernization is some of the important causes for the drastic changes in the LULC. To understand the changing process of Land use and land cover, some temporal data have been used and shown the changes that happened in the study area.

The below table explains how Land Use and Land Cover have been changed over the period in the BMP/BBMP and Bangalore Metropolitan Region. The table's source is a supervised classification image of three different periods that is 2001, 2011 and 2018 and took four major classes for the purpose of the Land Use and Land Cover classification. Because of satellite imagery is low-resolution satellite imagery and creating Level II class and Level III class is not possible. BMP/BBMP area is covered nearly 34% of the Bangalore Metropolitan Region. The significant impact in the Land Use and Land Cover has happened in the core region and BBMP area.

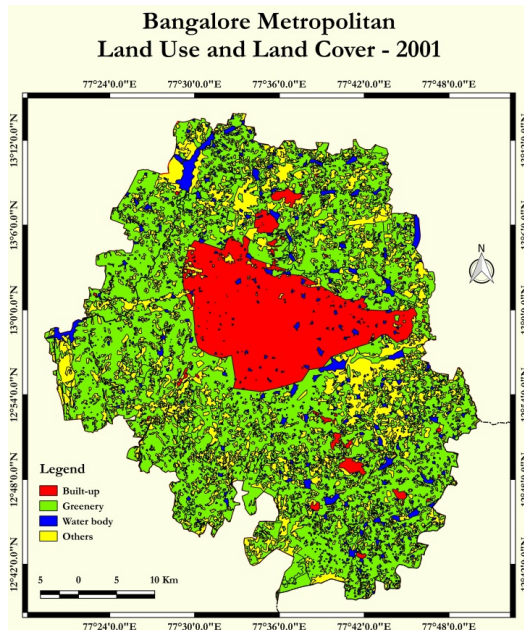


Fig. 4. Land use and land cover – 2001

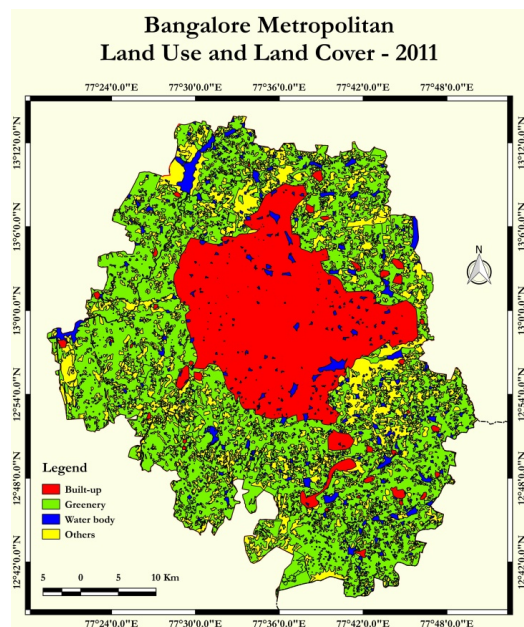


Fig. 5. Land use and land cover - 2011

The table representing 2001 data shows the major classes have Built-up area, Greenery, Water Body and Others, which covers nearly 40% in BMR and 36% in BMP region. Built-up areas are less in that time; hardly 15% area is covered in BMR region and 26% in BMP region in 2001. The built area

increased in 2011 and 2018 data the major part of the Land use and land cover comes under the built-up area. Other classes were decreasing gradually and converted the entire Bangalore Metropolitan Region into a concrete forest. The number of lakes also decreases every year, and other classes data have not shown any positive impact over the Land Use and Land Cover Classes.

The pattern of land use existing and proposed in 2015 in the BDA suggests raising the residential functional requirement from 28.48% in 2005 to 40.07% in the year 2015 and a reduction in the industrial land use from 9.65% to 6.80% respectively. Also, the 500 sq.km proposed green belt forming 65.39% of the total area in 2015 is expected to give new ecological and environmental support for all developing and growing demands of the metropolitan city activities by 2031. In the absence of compensatory greenery, there are reports of micro-climatic changes within the built-up city area, which are due to the impervious layer radiation. There is urgency in adding to the existing open space and parks. The Bangalore city area, with its orchards and central jail after being shifted outside the city's heart, will be the new park or open space within the city and will function as lung space. The present Lalbagh and Cubbon Park are insufficient to open spaces of the future city. Cubbon park has diminished in its greenery because of the gradual construction of buildings for RBI, Youth services, fisheries, tennis stadium, secretariat club, etc.

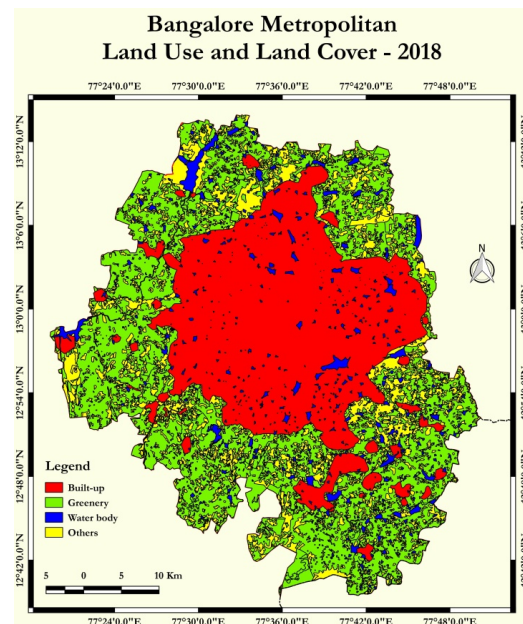


Fig. 6. Land use and land cover - 2018

Over a period of time, in the growth and development of the city, six major water tanks have been sacrificed for various uses such as Mille tank (built-up area), Longford tank (Hockey field), Dhanmambudi tank (Bus station), Binna-

Table 2. Land use and land cover of BMP and BMR - 2001

Land Use and Land Cover Class	BMP		BMR	
	Area (sq.km)	Area (%)	Area (sq.km)	Area (%)
Built-up	121.37	26.5	320.98	14.65
Greenery	152.97	33.4	843.54	38.50
Water Body	17.40	3.8	147.89	6.75
Others	166.26	36.3	878.59	40.10
Total	458	100	2191	100

Table 3. Land use and land cover of BBMP and BMR - 2011

Land Use and Land Cover Class	2011			
	BBMP		BMR	
	Area (sq.km)	Area (%)	Area (sq.km)	Area (%)
Built-up	353.42	47.70	628.82	28.70
Greenery	137.09	18.50	709.88	32.40
Water Body	21.49	2.90	107.36	4.90
Others	229.00	30.90	744.94	34.00
Total	741	100	2191	100

Table 4. Land Use and Land Cover of BBMP and BMR - 2018

Land Use and Land Cover Class	BBMP		BMR	
	Area (sq.km)	Area (%)	Area (sq.km)	Area (%)
Built-up	455.72	61.50	931.18	42.50
Greenery	109.30	14.75	627.72	28.65
Water Body	12.96	1.75	60.25	2.75
Others	163.02	22.00	571.85	26.10
Total	741	100	2191	100

mangala tank (Indiranagar), Sampangi tank (KanteeravaS-tauim), Kempambidu tank (Gavipuram extension), etc. many more tanks have disappeared either due to unauthorized construction, revenue site holders, slum or due to formation of new layouts. Smoke density increases with altitude and the absence of enough tree canopies in the urban area, water vapour from a water body can keep the environment cool pleasant. Further, a water body's economic and aesthetical utilities such as fishing and recreational are already lost. Most of these tanks that no longer exist were potential water sources and were recharging groundwater potential. There is a need to develop water bodies in the new layouts and improve the quantity and quality of the water in water bodies and use it for boating, etc.

Conclusion

In summing up, it can be stated that environmental considerations require the highest priority in the planning and devel-

oping the city. Environmental problems are such that we can say that whatever is needed has been done on a one time-based.

Environmental problems are continuing in nature and require be properly studying, understanding, and action initiated both in the short term and long term basis. In any planning, it is the long term basis that should draw our attention. General problems have been highlighted and what is required now is setting down a plan of action to affect the necessary remedial measures. Therefore, it would not be out of place to once again reiterate that emphasis that has to be laid on planning for the development of the city.

Prevent indiscriminate conversion of agricultural land to curb urban sprawl. Adopt the concept of green belt in and around Bangalore to preserve the environment and to ensure compact development. Enforce the zoning regulations and building bye-laws to ensure orderly development of the city.

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