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Report

Sustainable Financing for Urban Karnataka-Viable Options

August, 2018

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Indian Institute for Human Settlements

Sustainable Financing for Urban Karnataka-Viable Options

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Additionally, the project would not have been successful without the valuable support of the following people who spent time disseminating relevant data to us – elected representatives of the 12 ULBs, and the Commissioner/Deputy Commissioner/Municipal Commissioners/Chief Officers of the Municipal Corporations, City Councils and Town Municipal Councils. We are also indebted to the officials from the departments of revenue, administration, finance, town planning, environment, National Urban Livelihoods Mission(NULM), health and engineering who spent their precious time with us and provided important information.

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Swastik Harish

Lead – Urban Practitioners' Programme

Indian Institute for Human Settlements

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Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
CAA	Constitutional Amendment Act
CMAK	City Managers Association, Karnataka
CDI	Child Development Index
CMC	City Municipal Council
CNG	Compressed Natural Gas
DMA	Directorate of Municipal Administration
FSI	Food Security Index
GDP	Gross Domestic Product
HDI	Human Development Index
HPEC	High Powered Expert Committee
HRIDAY	Heritage City Development and Augmentation Yojana
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LPCD	Litres Per Capita Per Day
MC	Municipal Corporation
NULM	National Urban Livelihoods Mission
PMAY	Pradhan Mantri Awas Yojana
PPP	Public Private Partnership
SBM	Swachh Bharat Mission
SCM	Smart Cities Mission
SFC	State Finance Commission
STP	Sewage Treatment Plant
SWD	Storm Water Drain
TMC	Town Municipal Council
UNDP	United Nations Development Programme
MLD	Millions of Liters Per Day

Units

10 lakh = 1 million

1 crore = 100 lakh = 10 million 100

crore = 1 billion = 1000 million 1

lakh crore = 1 trillion = 1000 billion

Executive Summary

The objective of this study commissioned by the Directorate of Municipal Administration (DMA), Karnataka in conjunction with City Managers Association, Karnataka (CMAK) is to recommend the best possible measures to be taken to improve the revenue and financial status of Urban Local Bodies(ULBs) in Karnataka in a sustainable manner**.** The ULBs studied are **Bangarpet, Bidar, Chamrajnagar, Davanagere, Haliyal, Hubli-Dharwad, K R Nagar, Lingasugur, Sakleshpur, Sira, Ullal and Yadgir.**

IIHS has approached this study with the view that cities that reflect adequate local economic development and that are able to contain their local environmental risks, will be better positioned to be financially sustainable in planning, implementing and maintaining their developmental activities. This in turn will enhance the financial buoyancy of these ULBs.

Based on this approach, a holistic profile for each city was prepared from a detailed analysis of primary and secondary data. The parameters looked at included
a) Economic and Social – Regional connectivity, demographic trends, employment and livelihood and human development.
b) Environmental – Natural and man-made risk and resilience.
Diverse inputs from this analysis have further been coalesced into **typologies** that have helped categorise these cities and towns over their size or administrative class, regional or spatial (territorial), socio-economic, environmental and financial profiles. The typologies included:

- Need immediate attention: High vulnerable population, low Human Development Index(HDI), those that are mono-economic, water stressed, disaster prone
- Need offsetting of negative impact: Satellite towns, those seeing urban sprawl, those having large informal labour
- Need leveraging of advantage: Those having potential for tourism, trading towns, manufacturing towns, education hubs
- Need attention to negative impact if any: Those seeing transportation based development, high population growth, agriculture economy linkage

Using these typologies, the following recommendations have been provided:

1. Urban Governance:

   Bridging workshops for development of a 'Municipal Plan': Curate and conduct workshops regularly between the ULB and the line agencies. The workshops could be conducted at least every three years structured by the CMAK or other identified institutions with expertise in the field of urbanisation. This could be aligned with the district level visioning process and/or the District Planning Committee's (DPC) plans.

2. Land Leverage:

- Inner city redevelopment: Rejuvenate, re-densify and redevelop vacant lands by leveraging their land value and unused or under-utilised infrastructure. This can make better use of already commercially viable areas by increasing density and bringing in mixed land use.
- Converting slums on ULB Land to rental housing: ULBs give security of tenure to households by signing a 'land rent' agreement with the occupying household, in return for rent on the land occupied. Households remain 'owners' of the housing unit and become 'renters' of the land.
- Premium on third party transactions on municipal properties: Collect premium, transfer fees and a share of profits over a change of assignment of plots taken on lease from the ULB. This may be extended to cover ULB buildings currently on lease or rent

3. Green Jobs:

   These jobs within various sectors are not only aimed at boosting local economic development but also enhancing service delivery of the ULBs.

- Green mobility in urban areas: Development of green mobility systems supported by para-transit systems and non-motorised transport (NMT) infrastructure. The potential areas for job creation in green mobility include manufacture of green mobility solutions, servicing, maintenance and management, information systems and banking support
- Sustainable solid waste and waste water management: Generation of employment in sustainable practices such as Rainwater Harvesting (RWH), shallow well digging, and planning, implementation and management of sewage treatment plants (including decentralised waste water treatment systems).
- Urban farming: Generation of employment in the following sectors - Permaculture, gardening and nursery management (on ULB lands), soil and nutrient supply and household level service providers (installation and maintenance of roof top gardens, permaculture units etc.)

These recommendations have been prioritised for the 12 ULBs based on the typologies they fit into. They also have the potential to be extrapolated to all the ULBs in Karnataka keeping in mind their specific characteristics.

Chapter 1: Introduction to the project

The Directorate of Municipal Administration (DMA) Karnataka was looking for viable options to generate alternative sources for financing in ULBs, and had envisaged that an elaborate study would be conducted by financial experts. Recommendations will be given considering the scenario of the state, and best possible measures to be taken up for improving the revenue and/or financial status of ULBs in a sustainable manner. The City Managers Association Karnataka (CMAK) assisted the DMA by commissioning a 12-city study on sustainable municipal finance by a group of four organisations: Public Affairs Centre (PAC), Institute for Social and Economic Change (ISEC), Janaagraha and the Indian Institute for Human Settlements (IIHS).

As part of the project, the terms of reference for IIHS have been the following.

1. Develop a distinct and holistic scenario of the city's growth, trends and aspirations, based on inputs from PACs citizen surveys; identify patterns and aspirations

2. Develop a set of specific cases and solutions tailored to specific conditions, aiming to address not only the question to enhancing municipal finances, but also to lay out a roadmap for sustaining buoyancy in the long term financial health of the ULBs.

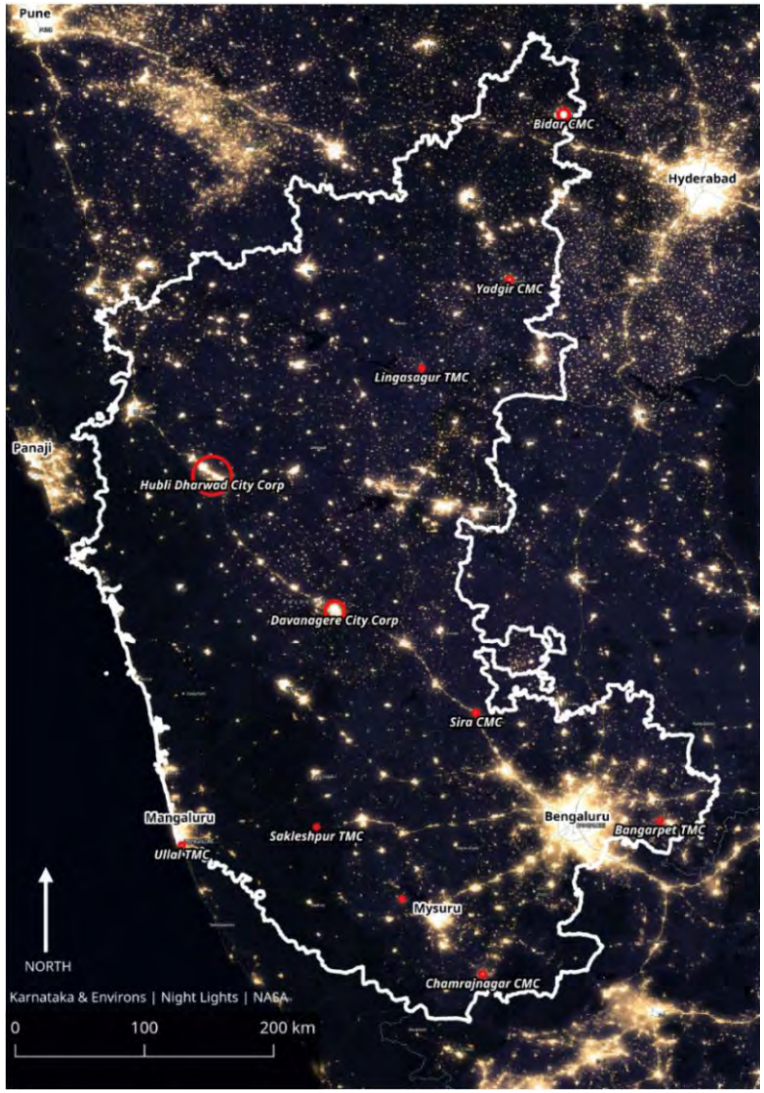


Figure 1: Karnataka -Nightlights NASA

Overview of the 12 ULBs

The unit of enquiry for this study is the ULB. Of the 12 ULBs chosen for the purpose of the study, two are Municipal Corporations(MC), four are City Municipal Councils(CMC) and six are Town Municipal Councils(TMC). As seen in Figure 1. they are not only spread across different geographical regions but also have varying population size (depicted through the size of the red circle). Given that it is a 'night lights map', this helps understand the spread of urbanisation within Karnataka. This urbanisation appears to be largely dominated by Bangalore, followed by the Mysore and Hubli-Dharwad region.

Figure 2 below helps understand the population growth trends across the 12 ULBs in comparison to the average of Karnataka (Urban) It can be seen that when the Bangalore Urban region is excluded, most of the 12 cities show a higher growth rate in comparison to Urban Karnataka, except Sakleshpur.

The decade between 1991-2001, saw a peak in the growth rates for all regions except K.R.Nagar and Sakleshpur. In the decade that followed, there was a general trend of fall in the growth rate and population projections estimate that there will be a steady growth in the population, with Haliyal and Yadgir being exceptions

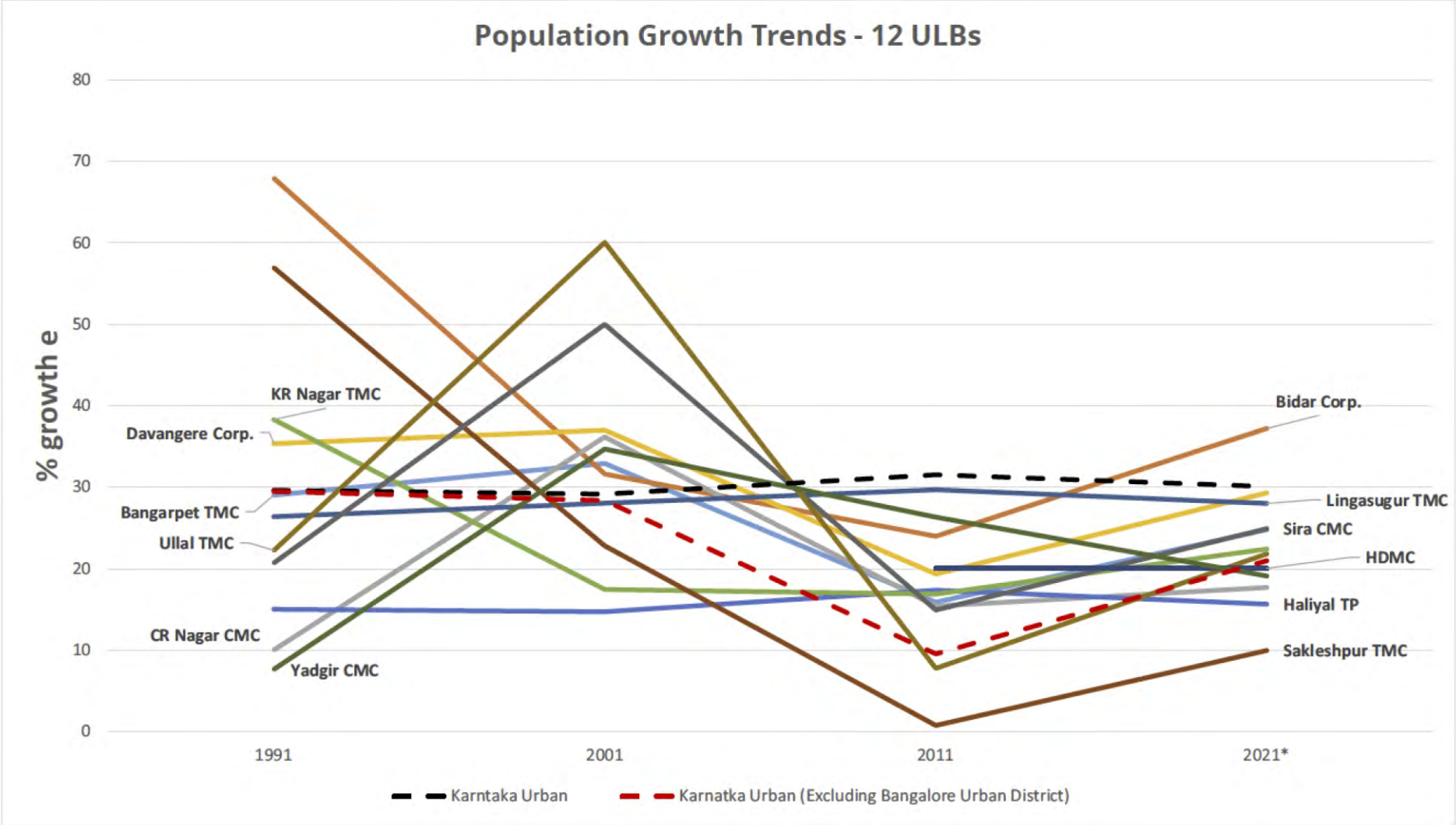


Figure 2: Population Growth trends - 12 ULBs

Method used for population projection explained in Annexure

Chapter 2 – Background

The Question of Municipal Financial Sustainability

India has seen a sharp increase in its urban population in the last four decades. It is a known fact that by 2050, over 50 per cent of the population in India will be living in urban areas. However, municipal governance and municipal bodies are not new to India. They have existed even before independence, and the idea of local governance and self-reliance was first endorsed through the 'Directive Principles of State Policy' of the Indian Constitution, constitutionally recognised with the passage of the 74th Amendment Act, 1992. This was based on the premise that local government bodies are better placed to understand the needs of the people and can plan and implement better at the grassroots. A list of 18 functions that were to be devolved gradually by the ULB was stated at this point.

With more people moving into cities, the magnitude and complexity of the tasks to be performed by ULBs has increased over the years. With the advent of schemes like the Jawaharlal Nehru National Urban Renewal Mission(JnNURM), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission(SCM), Heritage City Development and Augmentation Yojana(HRIDAY), Swachh Bharat Mission(SBM) and the National Urban Livelihoods Mission(NULM) , funds being pumped in for urban development have also increased.

However, the 74th Amendment has still not been implemented in its true spirit. The purpose of this amendment was to make ULBs self-sustainable, and one important way to do this is by making them financially sustainable. Joshi (2017) points out that ULBs have largely been characterised by poor resource base, lack of autonomy, low capacity to mobilise revenues, and high dependence on central and state level transfers and grants in aid. This is coupled with internal inefficiencies for financial management. Efforts need to be made to help ULBs raise their own finances by improving the efficiency and coverage in existing methods of collecting both tax and non-tax revenues.

ULBs also need to look at innovative methods to raise finance by leveraging benefits of the large scale urbanisation that most Indian cities are undergoing. While finances are vital for the sustenance and development of any ULB, there are several other factors which also influence its functioning and performance. The premise here is that 'a healthy city leads to a healthy ULB' and vice versa. We believe that for the holistic development of a ULB and the people it caters to, two factors are essential: economic and social development and knowledge of environmental risks.

Economic and Social Development

The spatial growth of a city and its dynamics, the demography, the employment patterns and the human development are factors that influence the overall development of the city, and consequently the ULB and its financial sustainability. While dissecting the city through these multiple indicators, the idea of local economic development and its potential will be explored.

This is mainly because most of the 12 ULBs that are being looked at for the study show a strong need for increase in employment opportunities in a sustained manner. The idea is to build upon the existing manpower and resource available within the ULB limits to get the economy running.

Except Hubli-Dharwad, Davanagere and Bidar, the rest of the cities are small in terms of population. This essentially means that they are small towns and their economies have their own limitations. Studies like that by Denis and Zérah(2017) on 'small towns' (towns with population between 10,000 and 1 lakh reveal that they are of various types: some largely transitionary environments or buffer zones between the rural hinterland and larger cities, some market towns that serve the rural population, some satellite towns to metro cities, some with their own industrial expansion and connect to a global market . Through the process of this study, the aim is to develop such typologies into which each of our study cities fit. An analysis of the potential of the city will be incomplete without looking at the Human Development Index (HDI) aspect. The HDI looks at indicators across three main areas: standard of living, health and education. One of the seven indicators considered for the calculation of standard of living index is per capita income. While economic development is an integral part of the standard of living that a city affords, it is not the only thing that contributes to the general well-being of its residents. Thus, a deeper study of the various indicators apart from HDI that are not doing so well is also needed, such as the Gender Inequality Index (GII), the Child Development Index (CDI) and the Food Security Index (FSI), for the holistic profiling of cities, and in turn point to possible modes of intervention from the ULB's side. Another factor that cannot be ignored when we talk about sustainable cities is the associated environment and the risk and resilience.

Environmental Risks

While planning for cities and their growth, it is essential to look at the existing natural resource base and its ability to support the existing and incoming population. Given that the ULB is the provider of basic services like water supply, sewerage and solid waste management, the service level benchmarks for these need to be evaluated, gaps identified and strategies made to fill these gaps. The absence or inadequate provision of these services has larger implications on the human and economic development of these cities. These in turn have direct and indirect costs on the ULB.

Depending on the existing and estimated demand, one needs to plan the city in such a way that there is constant supply of the resource, and there are resilient mechanisms to deal with it otherwise. Disasters, whether natural or man-made also need to be accounted for. These could include drought, floods, earthquakes, landslides, coastal erosions etc. Both economic and spatial planning for these kind of cities needs to focus on increasing their resilience.

Keeping these factors in mind, the following methodology has been used to understand the 12 ULBs holistically.

Chapter 3 – Methodology

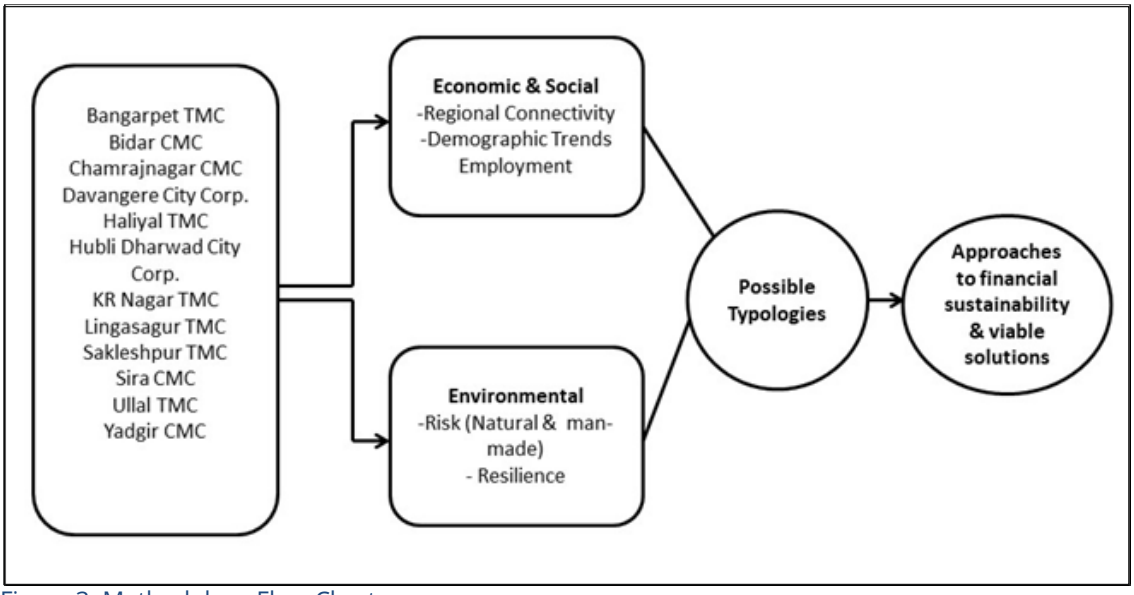


Figure 3: Methodology Flow Chart

As depicted in the Figure 3, the approach for the study has been that of profiling the 12 ULBs, which has then been used to develop an analytical framework for further research and the subsequent development of ways to enhance their financial viability. The profiling includes questions of the city's regional presence and character, spatial growth patterns, demographic and socio-economic profile, and the risk of environmental disaster, whether natural or man-made.

Through this exercise, a nearly unique profile of each city emerges. This is indicated by '**tags'** placed on the right top corner of each page of the city profiles. These tags, though informal and based on preliminary analysis, are useful to practically indicate the true nature of the city and its urbanisation story. A consolidated list of these tags is attached in Annexure 1.

Inputs from the other organisations, Janaagraha, ISEC and most importantly, PAC, have provided further inputs into the attitude and aspirations of the citizenry and an outline of the health of the ULBs financial strengths and weaknesses.

For the final analysis, these diverse inputs have been coalesced into '**typologies'** that have helped categorise these cities and towns over their size or administrative class, regional or spatial (territorial), socio-economic, environmental and financial profiles. The aim of developing these typologies has been to allow for a richer classification of towns and cities without losing their diversity, and yet keeping it simple for administrative and planning purposes.

CMAK coordinated visits to the 12 ULBs and cities for the IIHS team, along with teams from ISEC, PAC and Janaagraha. The IIHS team was able to ascertain the level of data available with the ULBs based on the checklist it had developed and submitted to the DMA and CMAK. The data checklist included data on governance, municipal finance and economic outlook, planning and infrastructure, human development, and environment and sustainability. This is attached as Annexure 2.

The IIHS team, along with the teams from PAC, Janaagraha and ISEC, were able to meet with key officials in all the four ULBs, including the Commissioner, Executive Officers and Councillors, and from the engineering, revenue, finance, and other departments. During group discussions, several key objectives, methodologies and outcomes of various ULB programmes and activities were brought to light.

Challenges and caveats

Of the sections of data required for the IIHS study, it was found that data on governance, municipal finance and planning was partly available with the concerned ULB. The data available in the four ULBs is summarised in the table on the following pages. However, detailed information on the economic outlook of the city, infrastructure requirements, human development, environment and sustainability was not directly available with the ULB. It was clarified that some of this data may be available with the relevant development and planning authorities. For further details, especially local environmental sustainability, human development indices and state level infrastructural planning, etc., additional secondary sources will be required.

The next part of the report will look into the 12 City Profiles.

Chapter 4: City Profiles

This part of the report will look into the 12 City Profiles covering the following aspects:

1. Spatial analysis

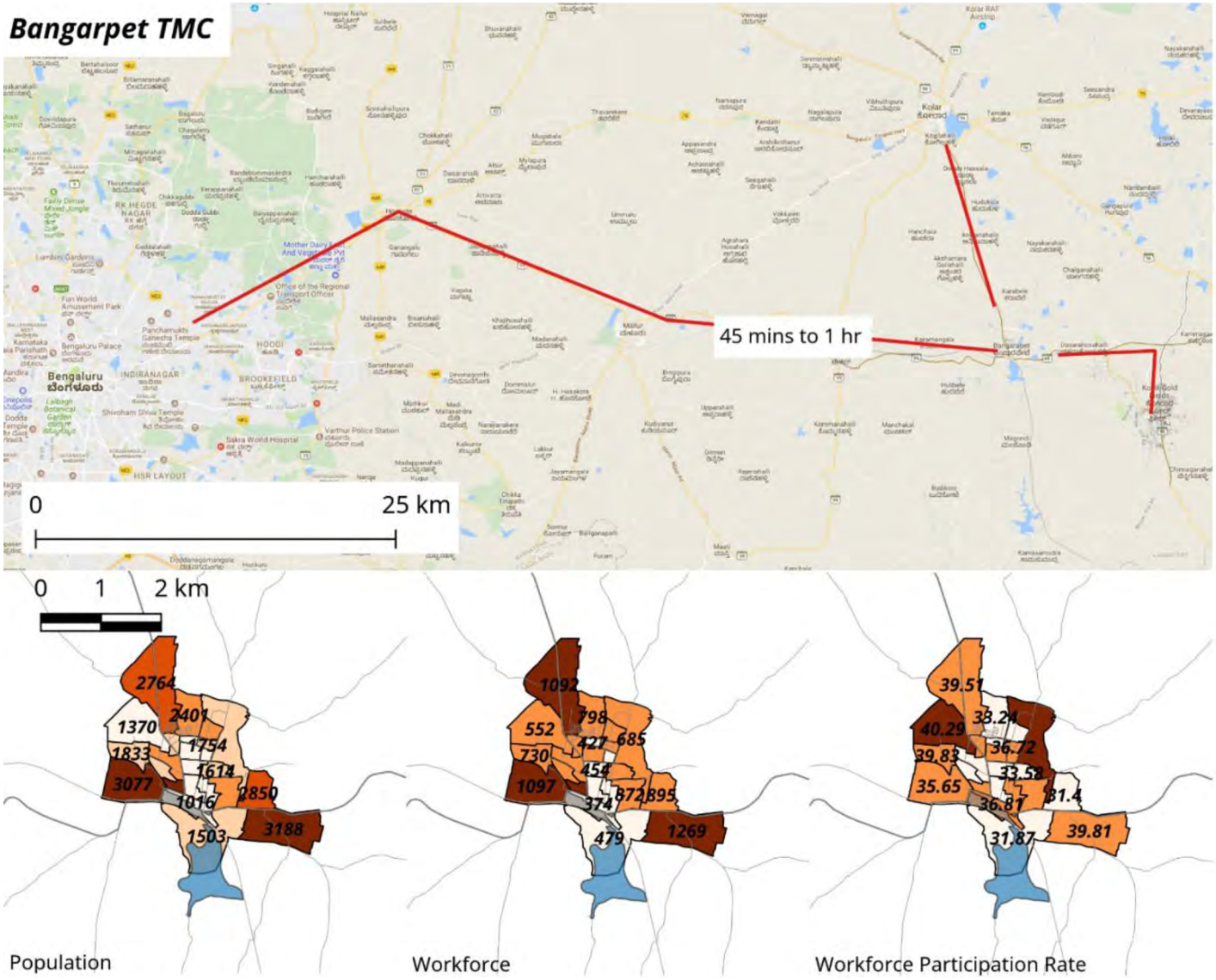
2. Demography and socio-economy

3. Human Development Indices

4. Environmental risks

Each city will have tags for the city profile and important characteristics/attributes of the city. These tags have been colour coded based on whether the attribute is a '**strength'** or a positive for the city, whether it is a **'moderate strength'** i.e. if it is not a weakness but not a very strong positive strength, whether it is a **'weakness'** or a vulnerability, or whether it is a **'neutral'** aspect that does not significantly influence the typology of the city.

Spatial profile - Bangarpet TMC



Data Source(s): IIHS Analysis, 2018, USGS, OSM.

Bangarpet Region

The regional connectivity of Bangarpet reflects key linkages to Kolar, KGF and Bengaluru. Anecdotally, it is well accepted that between 10,000 and 15,000 people travel to Bengaluru and back on a daily basis for work. Historically, it is known that the population of the city grew as a response to employment generated in the KGF.

Bangarpet Town

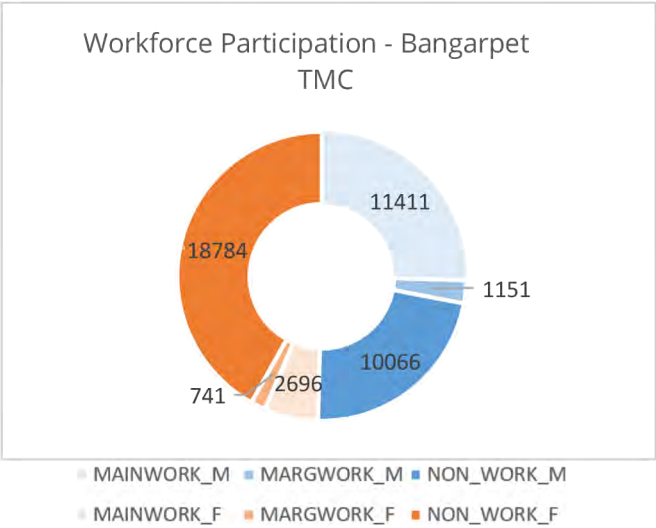
Bangarpet is a small town with about 45,000 population as per the Census of 2011. As can be seen in the maps, the population is not concentrated in the centre of the city where the main markets and government buildings are. Large parts of the population live along the three main transit corridors that converge in the city. These wards also contribute the maximum number of workers to the city.

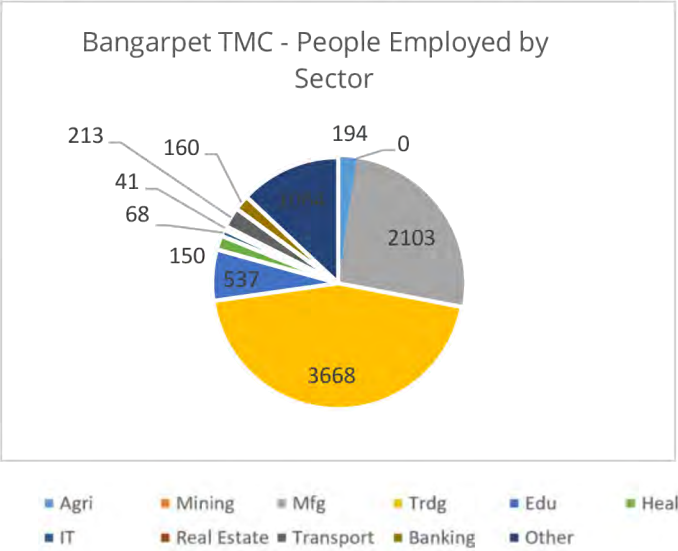
Economic outlook

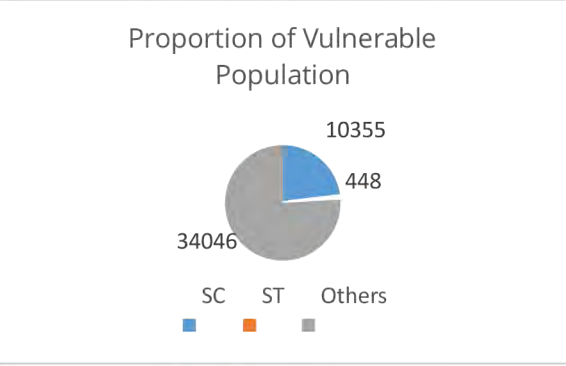
The key economic risk question that emerges is, therefore: what is the nature of employment that the citizens of Bangarpet engage in in Bengaluru? What are the risks of these jobs, especially if they are informal? At the same time, there is a low-intensity settlement pattern in the centre of the city—could this indicate the possibility of urban renewal?

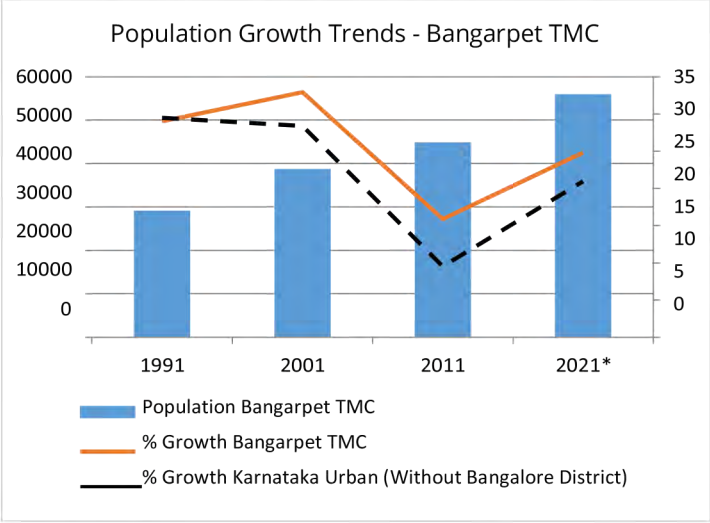
Bangarpet TMC *Satellite Town* *Vulnerable Population*

	SC	ST	Others
Male	5111	247	17270
Female	5244	201	16776
Total	10355	448	34046









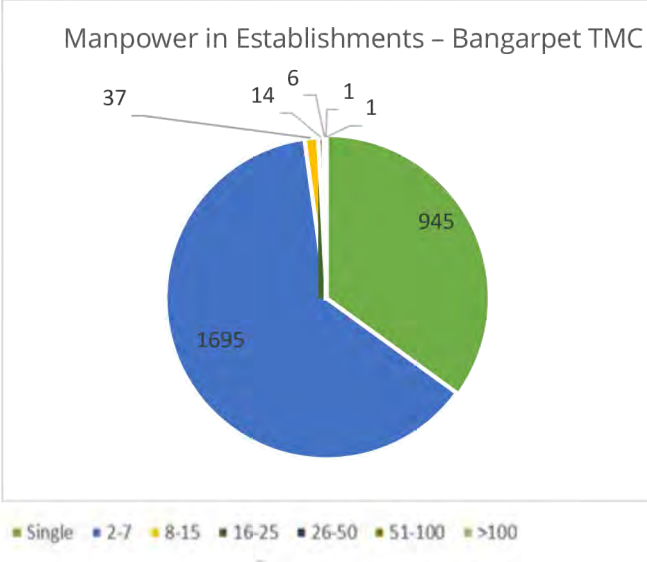


Figure 5: Demographic & Socio-economic Profile - Bangarpet TMC

Source : IIHS analysis, 2018

HDI & Environmental Profile - Bangarpet TMC

Human Development Indices *High HDI Low CDI*

Taluk	Population of Taluk	Urban population (%)	HDI	CDI	FSI
Bangarpet	445556	9.34	0.737	0.465	0.514

Environmental Risks *High Drought Water Scarce*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Water demand and availability

	Water demand (MLD)				Water availability (MLD)	Water availability reported by ULB during interview (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD		
2011	6.05	4.45	3.36	2.24	1.35	3.0 Ground water overexploited
2021	7.56	5.6	4.2	2.8		

Waste water generation and treatment capacity

	Waste water generated (MLD)				UGD and waste water treatment capacity
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	4.84	3.58	2.7	1.8	0
2021	6.04	4.47	3.35	2.23	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in Tonnes	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	9.4	11.74	21.16	171.56	5.69
Biodegradable (47%)	4.42	5.52			
Non-biodegradable					
Paper (8%)	0.75	0.94			
Plastic (9%)	0.85	1.06			
Rags (5%)	0.47	0.58			
Inert (25%)	2.35	2.93			
Others (6%)	0.56	0.71			

Table 1: Human Devlopment & Environmental Profile- Bangarpet TMC

Spatial profile - Bidar CMC

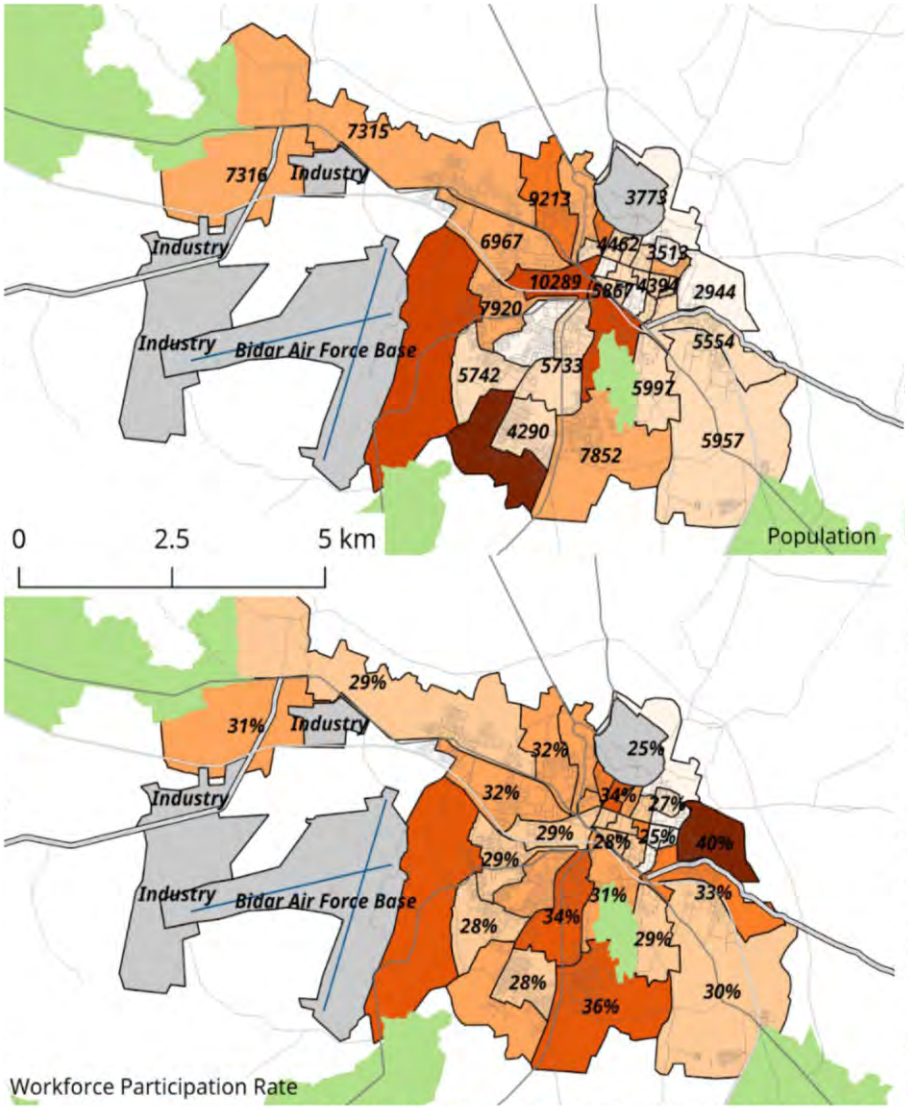
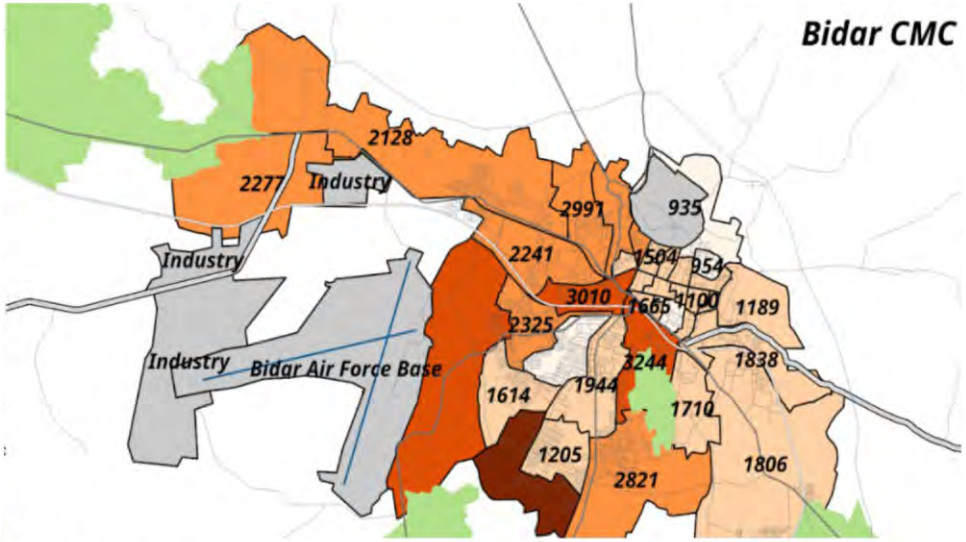


Figure 6: Spatial profile – Bidar CMC



Bidar Region

Bidar, in North Karnataka, is drought prone and has been facing a drought-like condition for the last five years. The Karanja dam and reservoir is the main source of water for the city, in-migration from Aurad and Bhalki is a common cause of the increase in the urban population.

Bidar Town

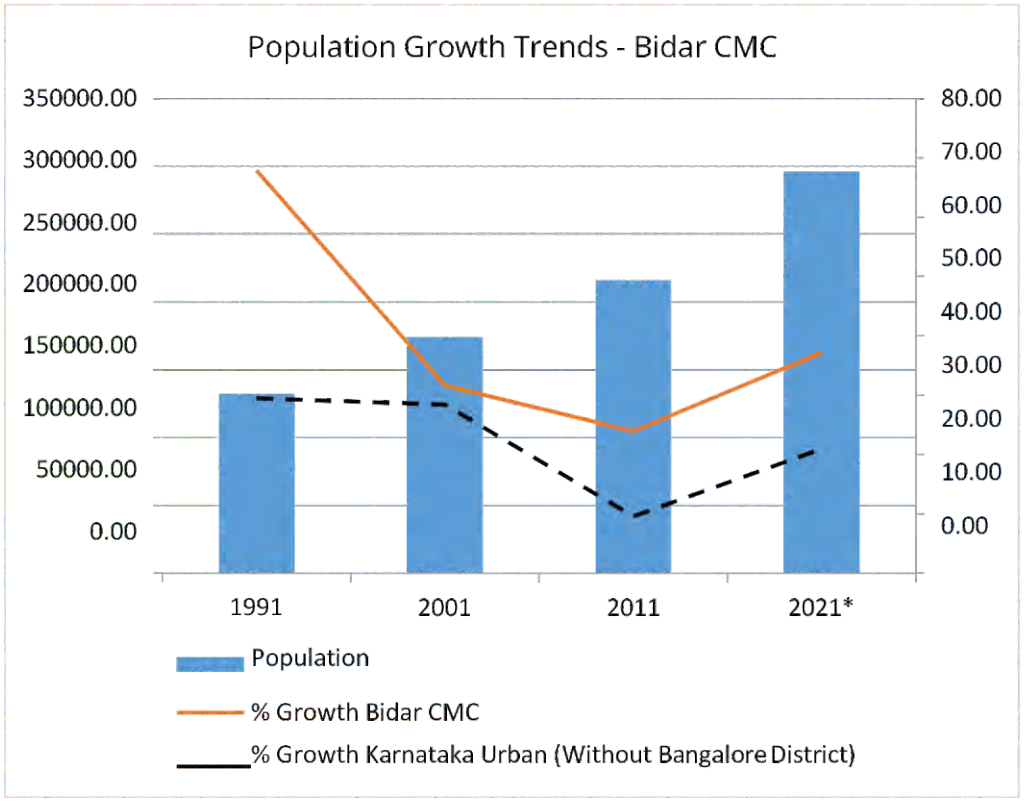
The Bidar Urban Development Authority has made a master plan for the city. The town hosts private and government engineering colleges, a medical college, a few pharmacy colleges and a university. The Bidar fort and its accoutrements offer some potential for tourism.

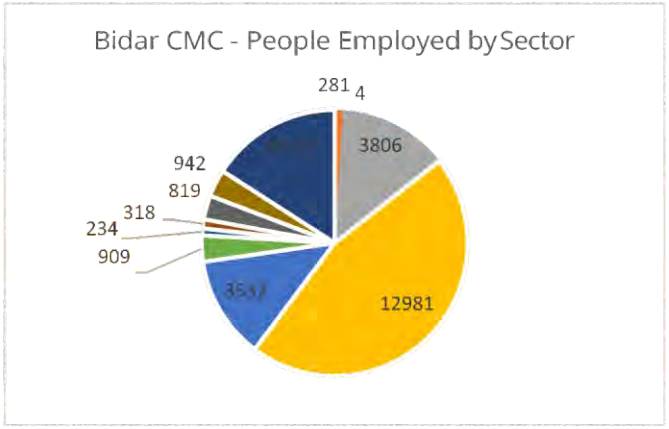
Economic Outlook

Educated youth are attracted to migrate to Hyderabad—a few hours away by road—for jobs. There are few industries coming up even though there appears to be land for the same. This could be attributed to the general paucity of water.

Bidar CMC *High Growth*

	SC	ST	Others
Male	15217	10195	90282
Female	14548	5129	84131
Total	29765	5066	134453





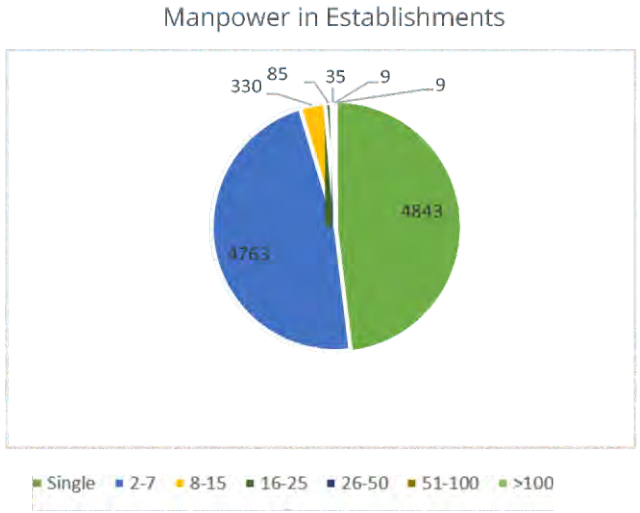
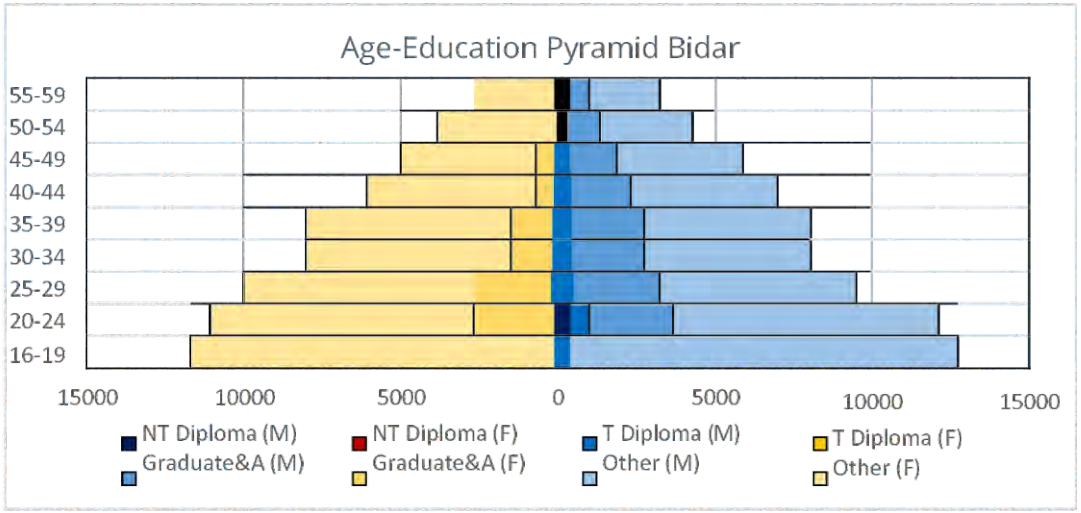


Figure 7: Demographic & Socio-economic Profile – Bidar CMC



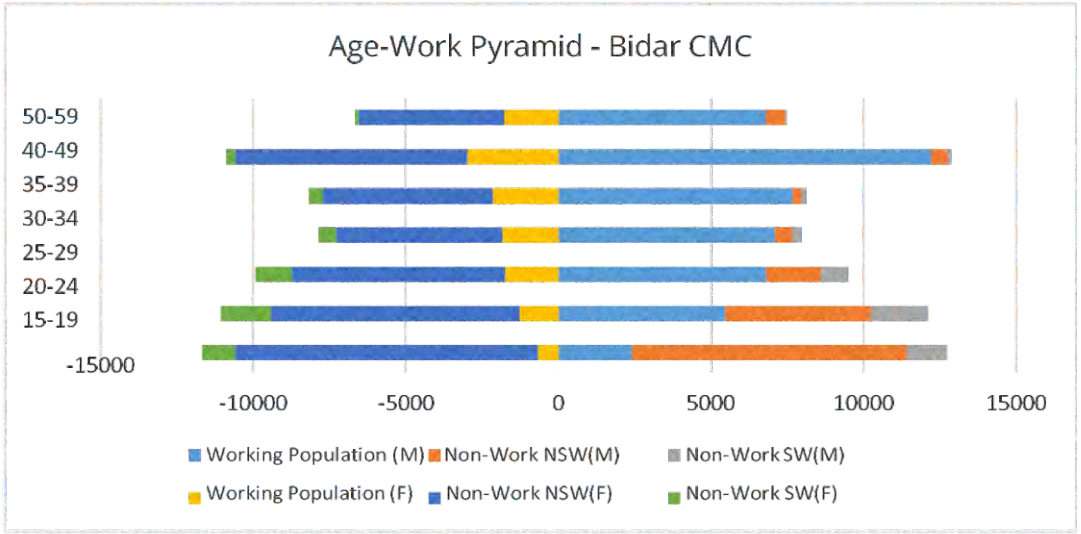


Figure 8: Demographic & Socio-economic Profile – Bidar CMC

Human Development Indices *High HDI – High CDI*

Taluk	Population of taluk	Urban population (%)	HDI	CDI	FSI
Bidar	469941	45.97	0.889	0.723	0.582

Environmental Risks *High Drought Moderate Wind and Cyclone Risk*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Very highly Vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Moderate damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	29.16	21.60	16.20	10.8	23.5
2021	40.01	29.64	22.23	14.82	

Waste water generation and treatment capacity

	Waste water generated (MLD)				UGD and waste water treatment capacity
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	23.33	17.28	12.96	8.64	172 MLD STP under progress. 89 km UGD work completed.
2021	32	23.71	17.8	11.85	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	45.36	62.24	129.0	761.71	0.0
Biodegradable (47%)	21.32	29.25			
Non-biodegradable					
Paper (8%)	3.63	4.98			
Plastic (9%)	4.08	5.61			
Rags (5%)	2.27	3.11			
Inert (25%)	11.34	15.56			
Others (6%)	2.72	3.73			

Table 2: Human Development & Environmental Profile – Bidar CMC

Spatial profile - Chamarajnagar CMC

Chamarajnagar CMC *Satellite Town*

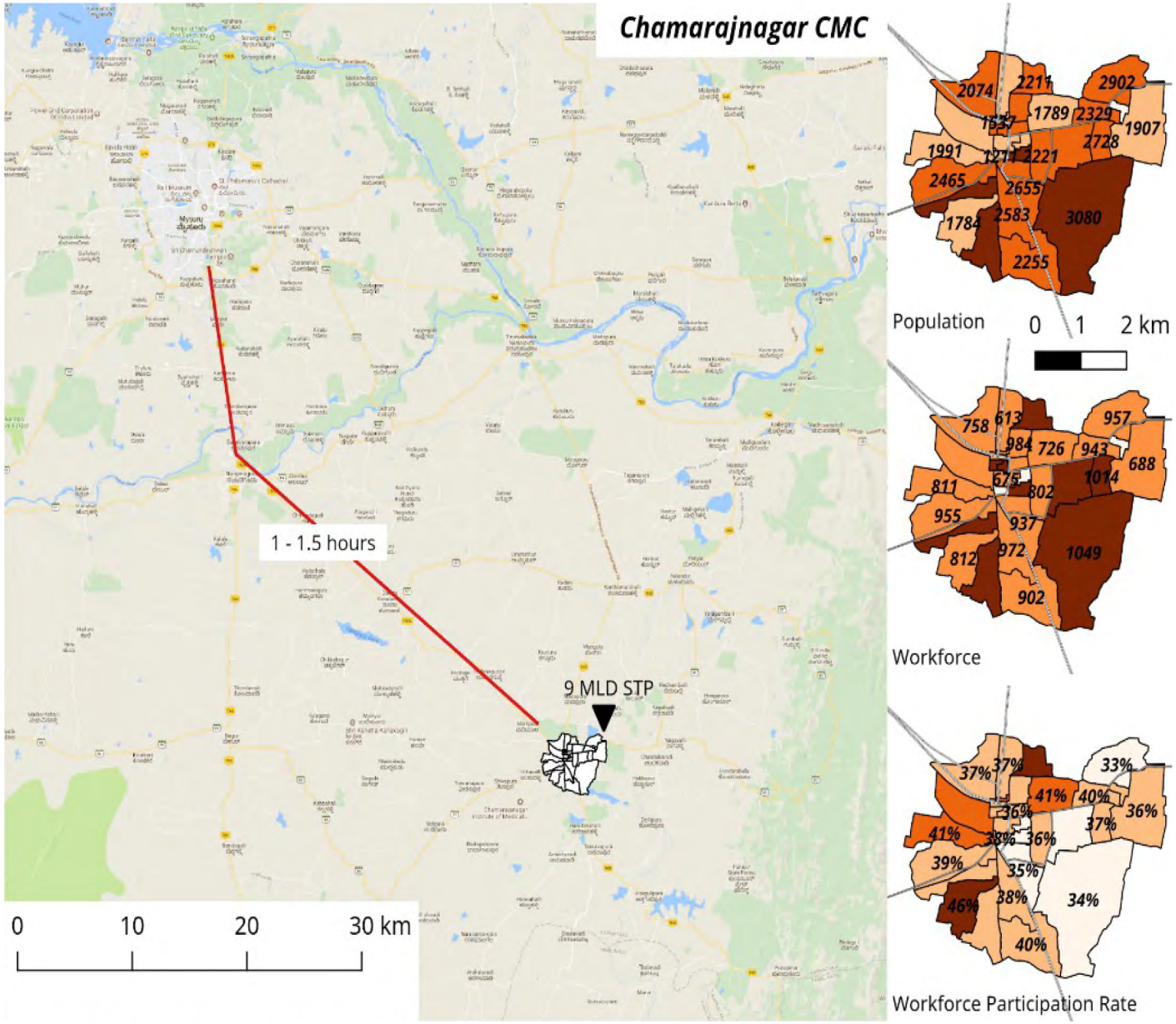


Figure 9: Spatial profile - Chamarajnagar CMC

Chamarajnagar Region

Chamarajanagar is located about one and a half hours away by road from Mysuru, the dominant urban centre in the region. It is close to the BR Hills (to the east) and the state border with Tamil Nadu (to the south-west).

Chamarajnagar Town

The town has a population of about 70,000 people across about 16,000 households as per the Census of 2011. The population distribution is of a radial pattern and follows the arterial roads of the town towards the south and east. The contribution to the town's workforce seems directly related to the population spread. The Chamarajnagar Urban Development Authority (CHUDA) is in the process of developing a Master Plan for the town.

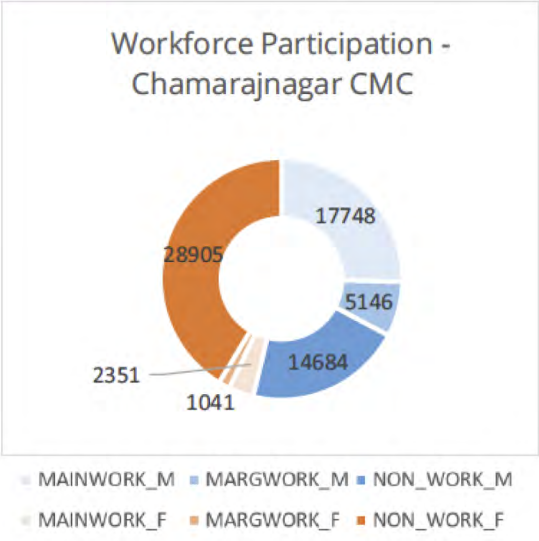
Economic Outlook

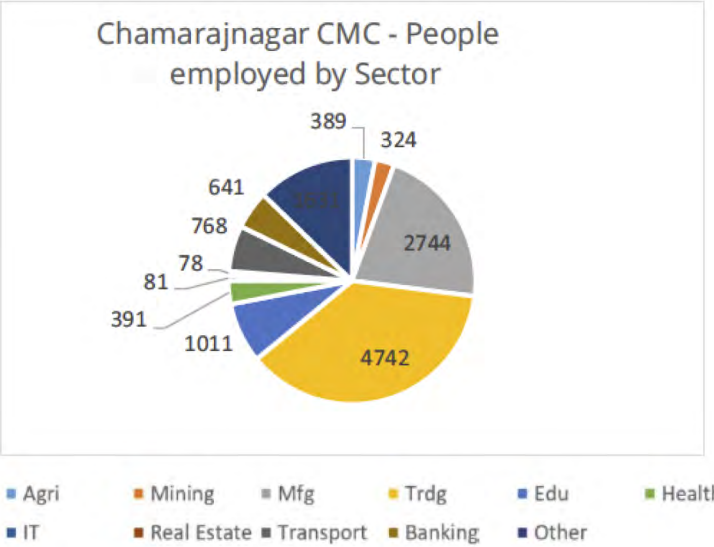
A significant proportion of the town's population depends on local consumption-oriented trade for its livelihood. A sizeable proportion of the town's population depends on agriculture, while the rest travel to Mysuru for work.

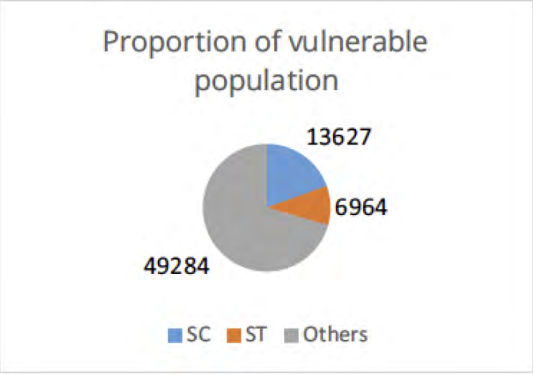
Chamarajnagar CMC

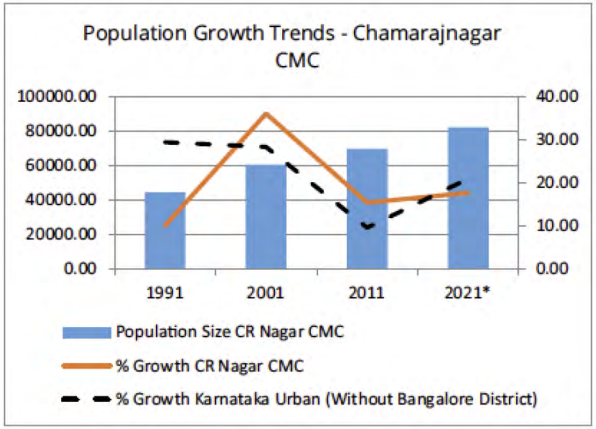
Low Growth *Satellite Town*

	SC	ST	Others
Male	6886	3392	24505
Female	6741	3572	24779
Total	13627	6964	28693









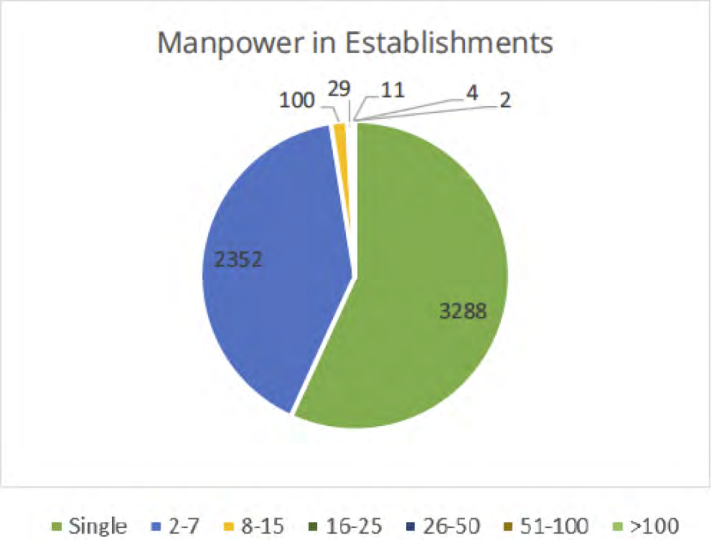


Figure 10: Demographic & Socio-economic Profile - Chamarajnagar CMC

Human Development Indices *High HDI – Low CDI*

Taluk	Population of taluk	Urban population (%)	HDI	CDI	FSI
Chamarajanagar	357799	19.53	0.726	0.460	0.412

Environmental Risks *High Drought*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Highly Vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	9.43	6.99	5.24	3.49	6.0
2021	11.10	8.22	6.17	4.11	

Waste water generation and treatment capacity

	Waste water generated (MLD)				UGD and waste water treatment capacity
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	7.54	5.59	4.19	2.79	9.0 yet to be commissioned 103.5 km UGD completed 70% area covered
2021	8.88	6.58	4.93	3.29	

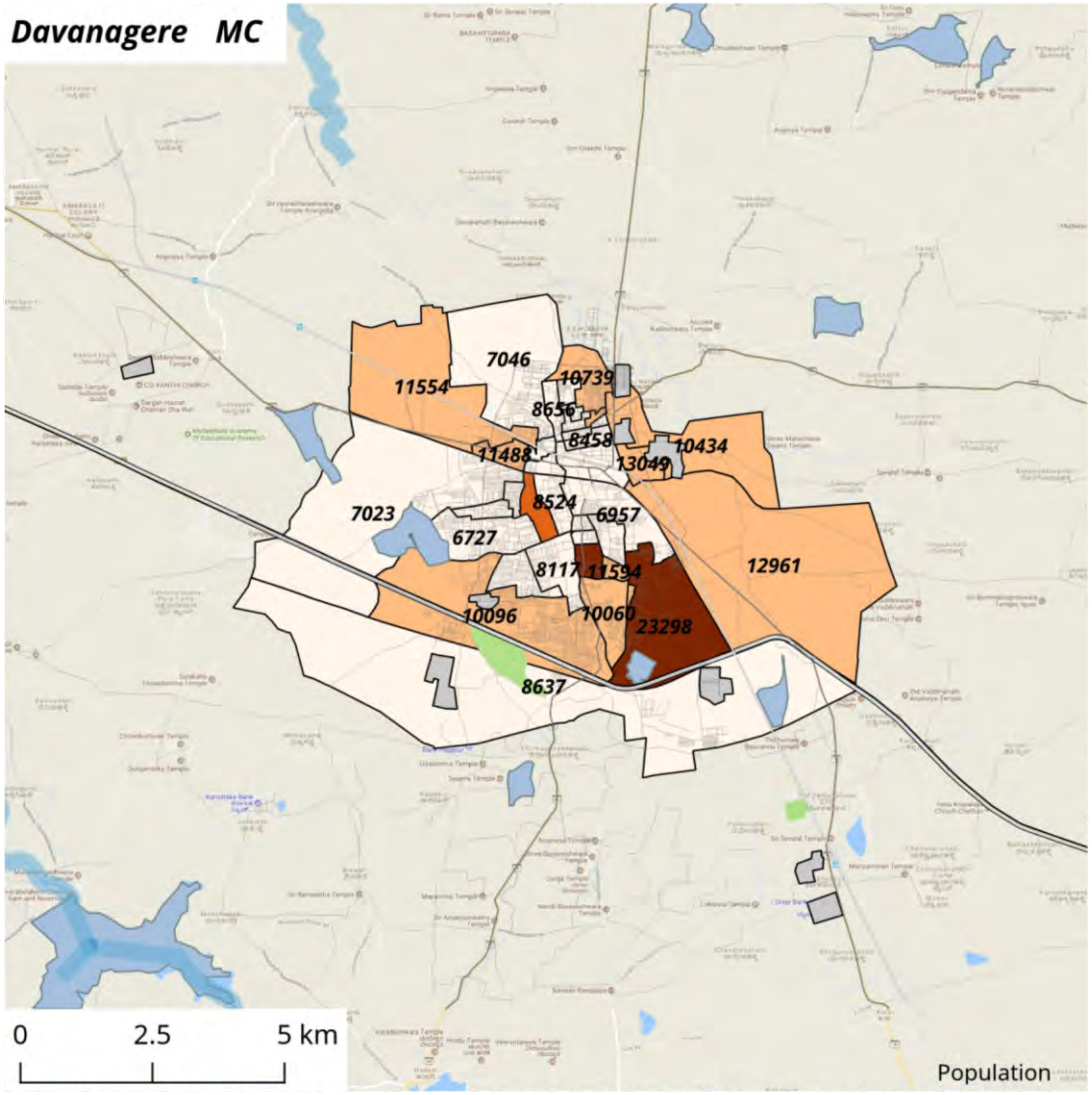
Status of solid waste management

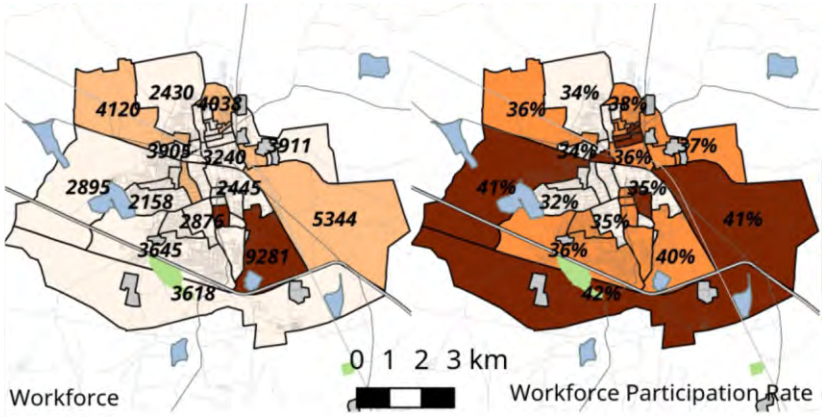
	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	14.66	17.27	30.0	286.48	0.0
Biodegradable (47%)	6.89	8.12			
Non-biodegradable					
Paper (8%)	1.17	1.38			
Plastic (9%)	1.32	1.55			
Rags (5%)	0.73	0.86			
Inert (25%)	3.67	4.32			
Others (6%)	0.88	1.04			

Table 3: Human Development & Environmental Profile - Chamarajanagar CM

Spatial profile - Davanagere MC

Davanagere MC *Urban Sprawl*





Davanagere Region

Around 1997-98 Davanagere was upgraded from Taluk HQ to a District HQ.

Davanagere Master Plan

The Davanagere Urban Development Authority has formulated a master plan for the city till 2021. Davanagere is a designated Smart City and is entitled to funding to the tune of Rs. 1000 crore from the central and state governments in order to implement its Smart City projects.

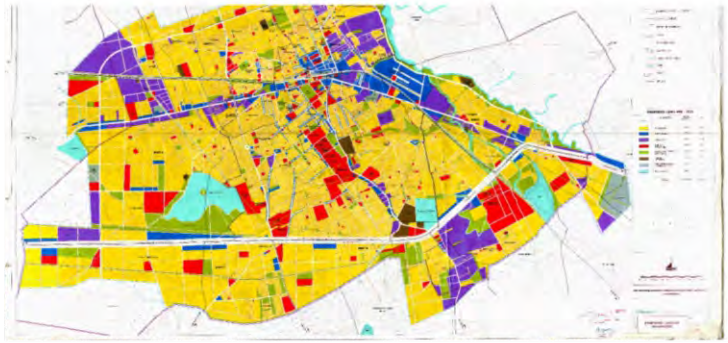
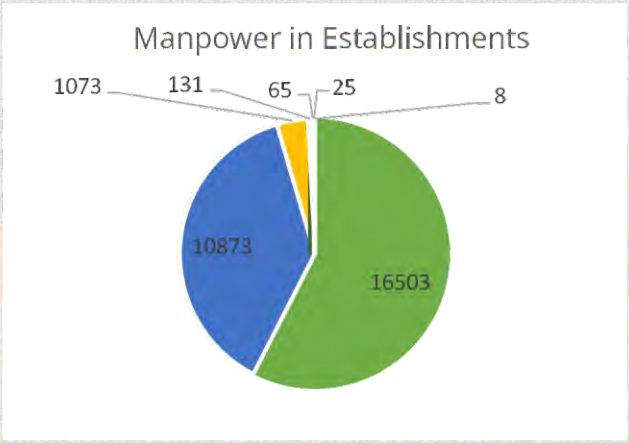
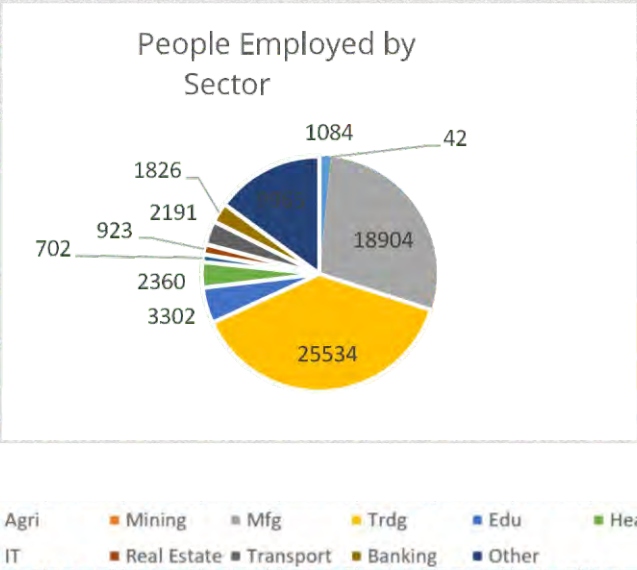


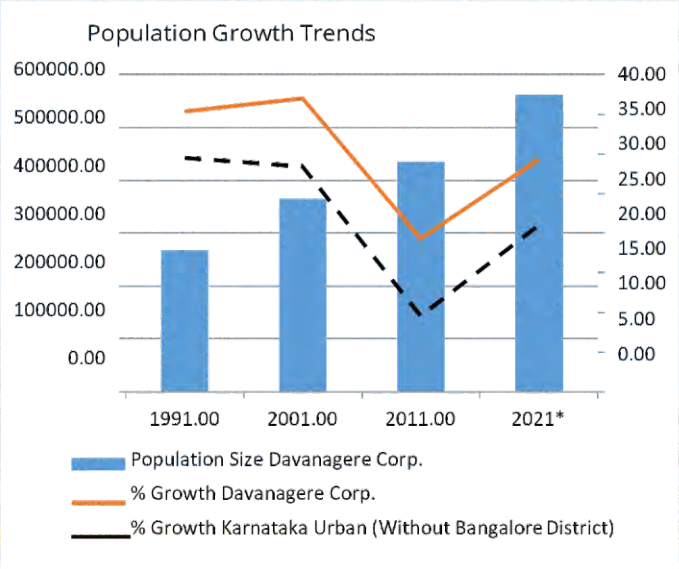
Figure 11: Demographic & Socio-economic Profile – Davanagere MC

Davanagere City Corp. *High growth*

	SC	ST	Others
Male	27219	13398	179159
Female	26888	13430	174877
Total	54107	26828	273101







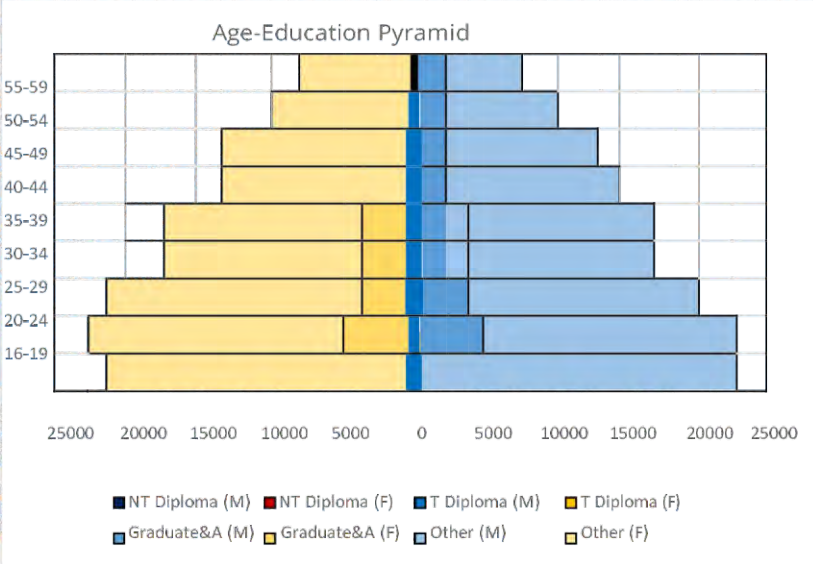


Figure 12: Demographic & Socio-economic Profile - Davanagere MC

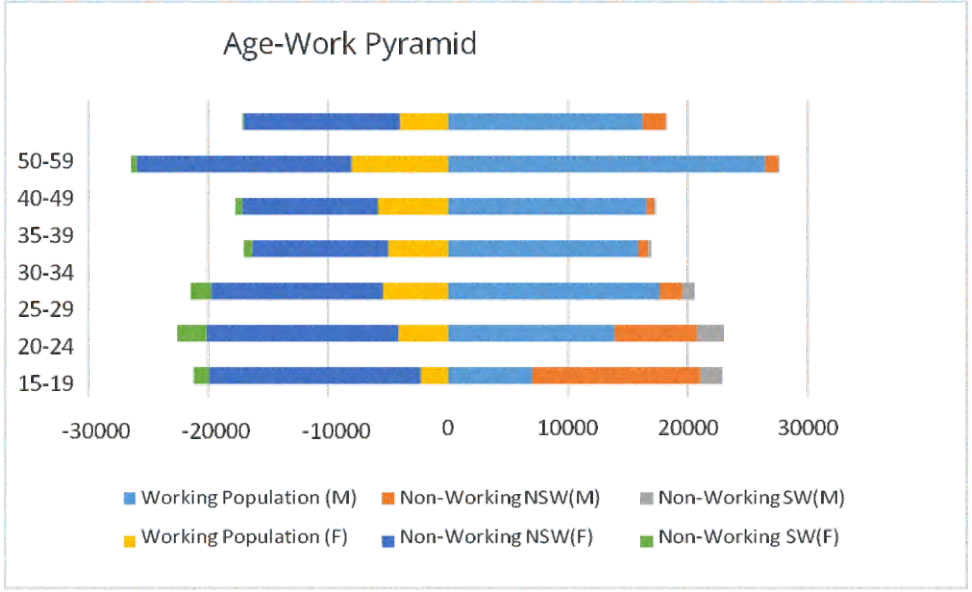


Figure 13: Demographic & Socio-economic Profile - "Davanagere MC"

HDI & Environmental Profile - Davanagere MC

Human Development Indices *High HDI – Low CDI*

Taluk	Population of taluk (in lakh)	Urban population (%)	HDI	CDI	FSI
Davanagere	6.82	63.78	0.991	0.4822	0.595

Environmental Risks *Very High Drought*

1. **Natural hazard vulnerability (taluk level)**

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Very highly Vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. **Manmade hazard vulnerability (ULB specific)**

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	58.72	43.50	32.62	21.75	64.0 surface water source
2021	75.93	56.24	42.18	28.12	Additionally 30.0 purchased

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	46.98	34.80	26.10	17.40	6.0
2021	60.74	44.99	33.75	22.50	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	91.34	118.10	68.0	2545.0	50.0
Biodegradable (47%)	42.93	55.51			
Non-biodegradable					
Paper (8%)	7.32	9.45			
Plastic (9%)	8.22	10.63			
Rags (5%)	4.56	5.91			
Inert (25%)	22.83	29.52			
Others (6%)	5.48	7.08			

Table 4: Human Development & Environmental Profile - Davanagere MC

Spatial profile - Haliyal TMC

Haliyal TMC *Satellite Town*

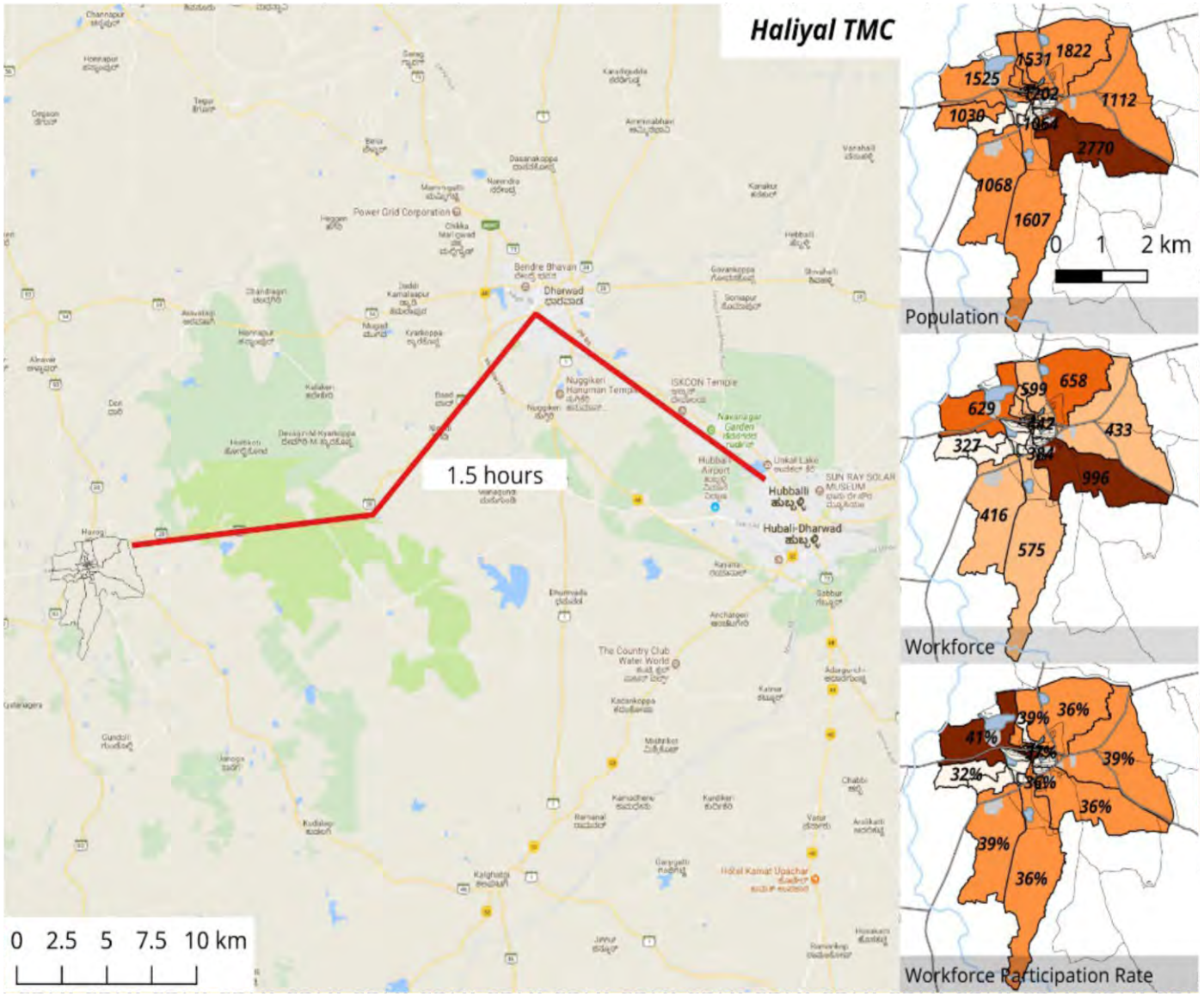


Figure 14: Spatial profile – Haliyal TMC

Haliyal Region

Haliyal, located in the Uttara Kannada district, is about one and a half hours away by road from Hubli-Dharwad, the dominant urban agglomeration in the region. The main source of water in the region is the Kali River, which is about 23 km away.

Haliyal Town

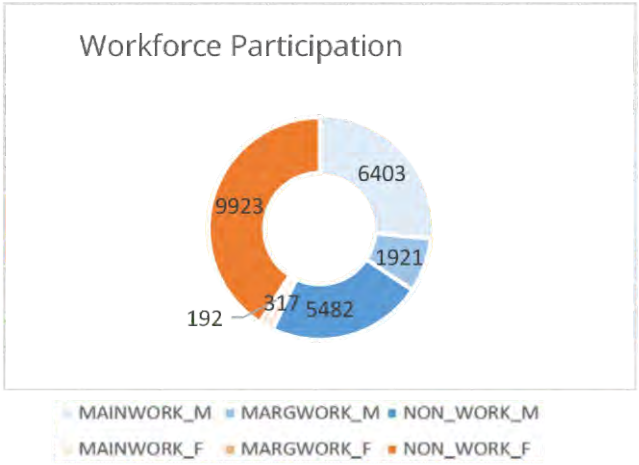
Haliyal is a small town with a population of about 25,000. From 20 wards as per Census 2011, it now has 23 wards, as per the latest town plan. Haliyal shows an even distribution of population and workforce participation.

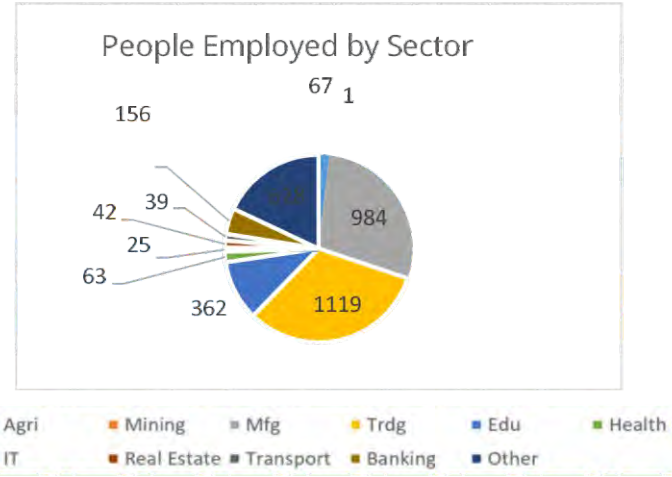
Economic Outlook

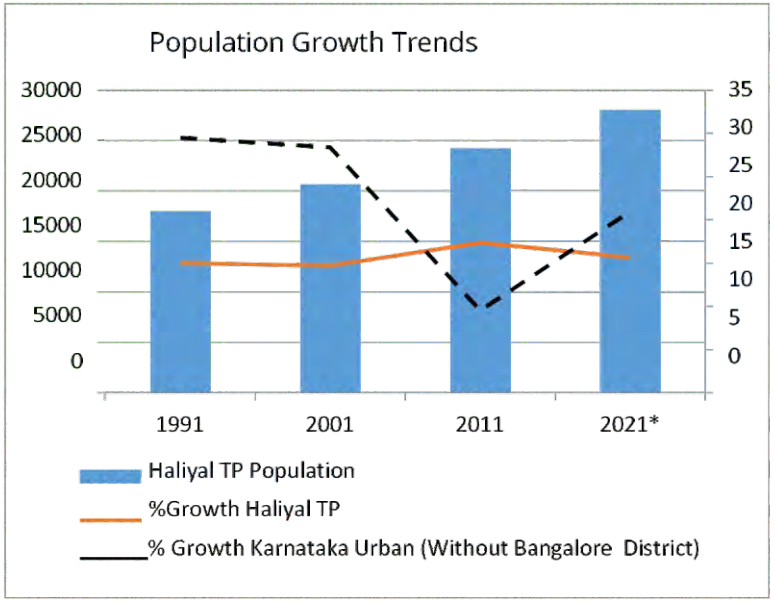
Haliyal's economic outlook is influenced by its proximity to Hubli-Dharwad. The town is home to a number of sugar factories, the largest being Parrys Sugar Industries Ltd. About 300 local people work in these factories. Further, a significant part of the workforce in engaged in carpentry, metal work and daily wage jobs.

Haliyal TMC *Mono-economic* *Low Growth*

	SC	ST	Others
Male	1767	204	10231
Female	1745	222	10069
Total	3512	426	16362







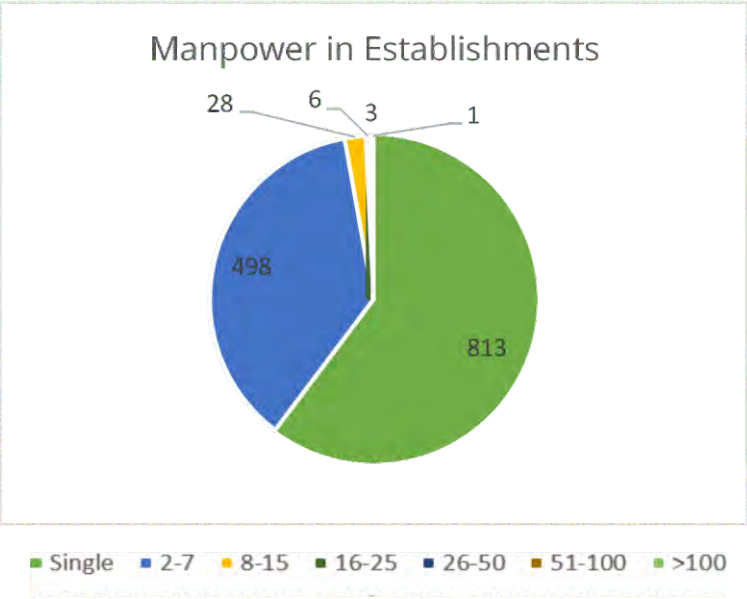


Figure 15: Demographic & Socio-economic Profile - Haliyal TMC

Human Development Indices *Low HDI – Low CDI*

Taluk	Population of taluk (in lakh)	Urban population (%)	HDI	CDI	FSI
Haliyal	1.9	12.76	0.379	0.256	0.444

Environmental Risks *Moderate Drought Moderate Wind and Cyclone Risk Urban Floods*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Moderately vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Moderate damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Urban floods: Frequency reported 2007, 2009, 2014,2015

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	3.27	2.42	1.82	1.21	5.0
2021	3.78	2.80	2.10	1.40	

Waste water generation and treatment capacity

	Waste water generated (MLD)				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	2.62	1.94	1.45	0.97	0.0
2021	3.03	2.24	1.68	1.12	(Proposal for UGD & STP costing 74 Cr submitted)

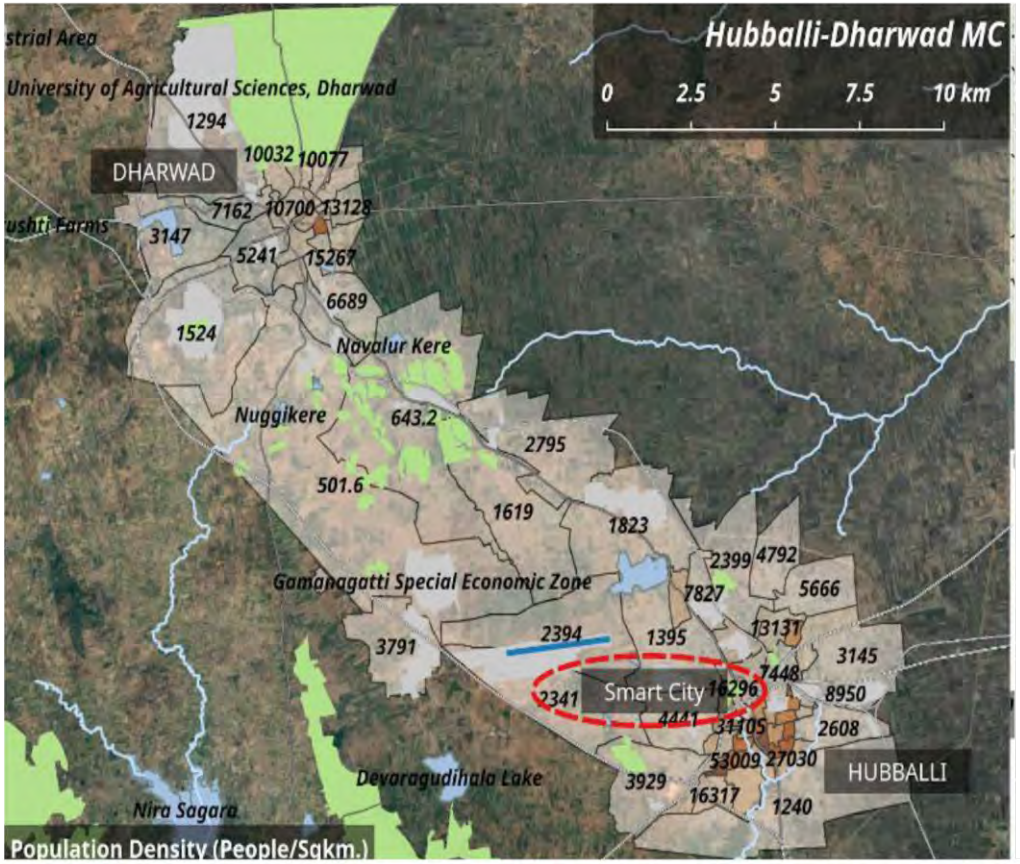
Status of solid waste management

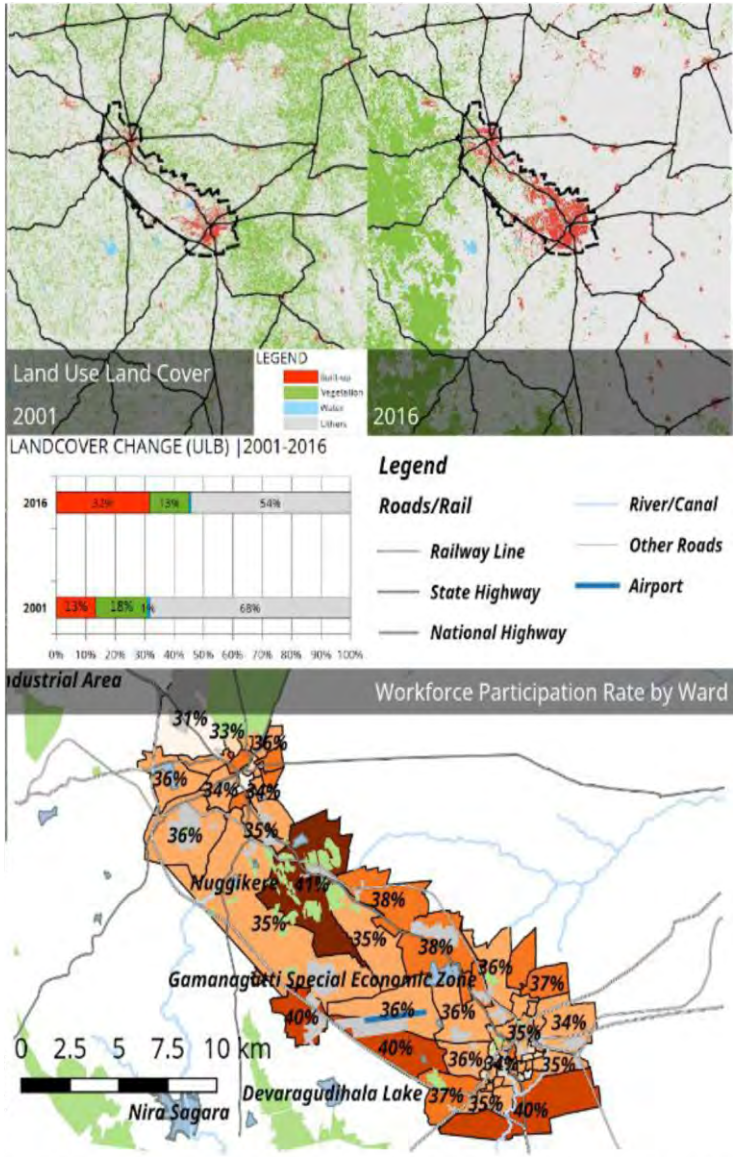
	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	5.09	5.88	8.48	117.2	0.0
Biodegradable (47%)	2.39	2.77			
Non-biodegradable					
Paper (8%)	0.41	0.47			
Plastic (9%)	0.45	0.53			
Rags (5%)	0.26	0.29			
Inert (25%)	1.27	1.47			
Others (6%)	0.31	0.35			

Table 5: Human Development & Environmental Profile – Haliyal TMC

Spatial profile - Hubli Dharwad MC

Hubli-Dharwad MC.: *Transportation Based Development* *Urban Sprawl*





Hubli-Dharward Region

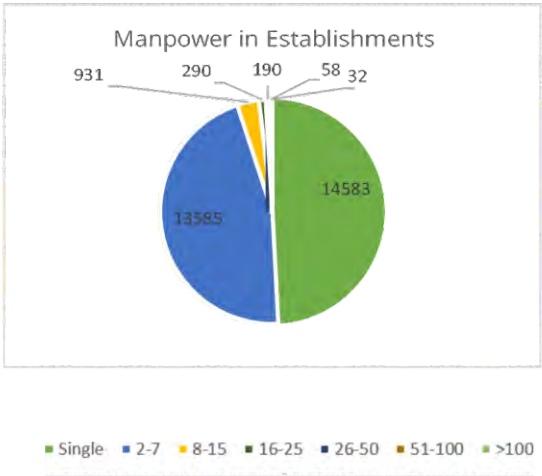
Hubli-Dharwad is the foremost urban agglomeration in the region. It is located on the Golden Quadrilateral along the Bengaluru-Mumbai Economic Corridor. It is a regional administrative, railways, warehousing/logistics, industrial, educational and cultural hub. It is also home to the region's largest Agricultural Produce Market Committee (APMC) yard. The twin cities as a centre for business for the surrounding districts. They face the challenges of unplanned spatial growth and lack of connectivity. The two cities are currently being integrated through a Bus Rapid Transit System, with an aim to develop the intervening zones of the city.

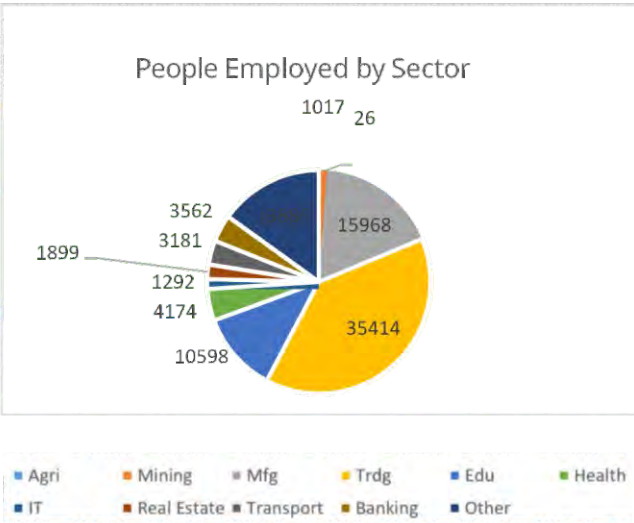
Figure 16: Spatial profile – Hubli-Dharwad MC

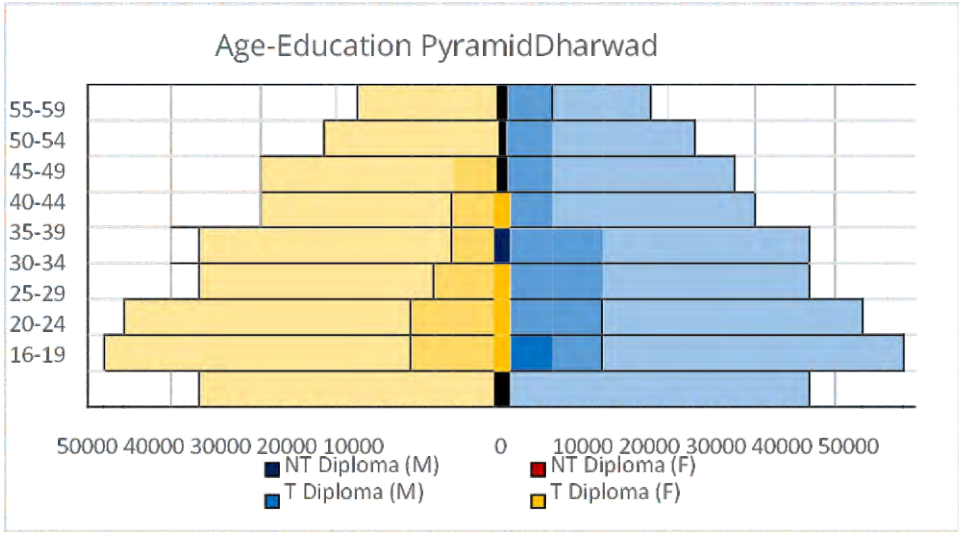
Hubli Dharwad CMC

High Growth

	SC	ST	Others
Male	45880	17003	411635
Female	46864	17232	405174
Total	92744	34235	689830







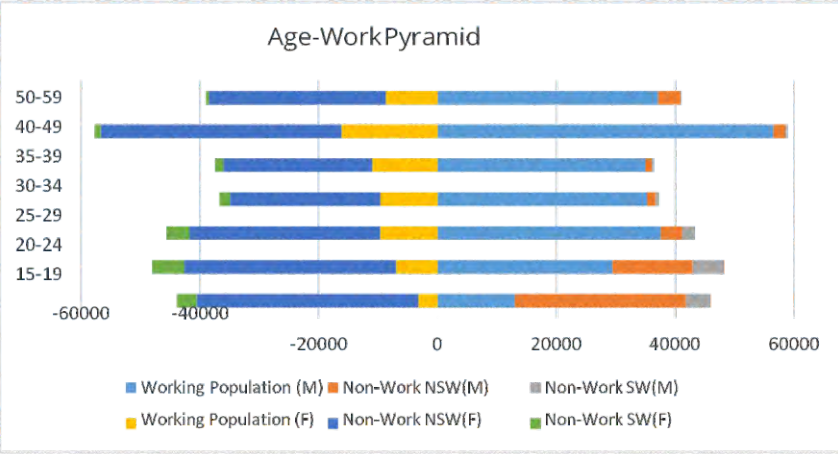


Figure 17: Demographic & Socio-economic Profile - Hubli-Dharwad MC

Human Development Indices *High HDI – Low CDI*

Taluk	Population of taluk	Urban (HDMC) population (%)	HDI	CDI	FSI
Dharwad	249344	51.10%	0.534	0.5	0.507
Hubli	142218		0.684	0.154	0.616

Environmental Risks *High Drought Urban Floods*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Urban floods: Frequency reported 2007, 2009, 2014, 2015

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	127.41	94.38	70.78	47.19	182.63
2021	152.95	113.30	84.97	56.65	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	101.93	75.50	56.63	37.75	40.0
2021	122.36	90.64	67.98	45.32	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	198.19	305.9	359.4	3667.06	551.08
Biodegradable (47%)	93.15	143.78			
Non-biodegradable					
Paper (8%)	15.85	24.47			
Plastic (9%)	17.83	27.53			
Rags (5%)	9.93	15.29			
Inert (25%)	49.54	76.47			
Others (6%)	11.89	18.36			

Table 6: Human Development & Environmental Profile - Hubli-Dharwad MC

Spatial profile - Krishnarajnagar TMC

Krishnarajnagar TMC *Satellite Town* *Urban Sprawl*

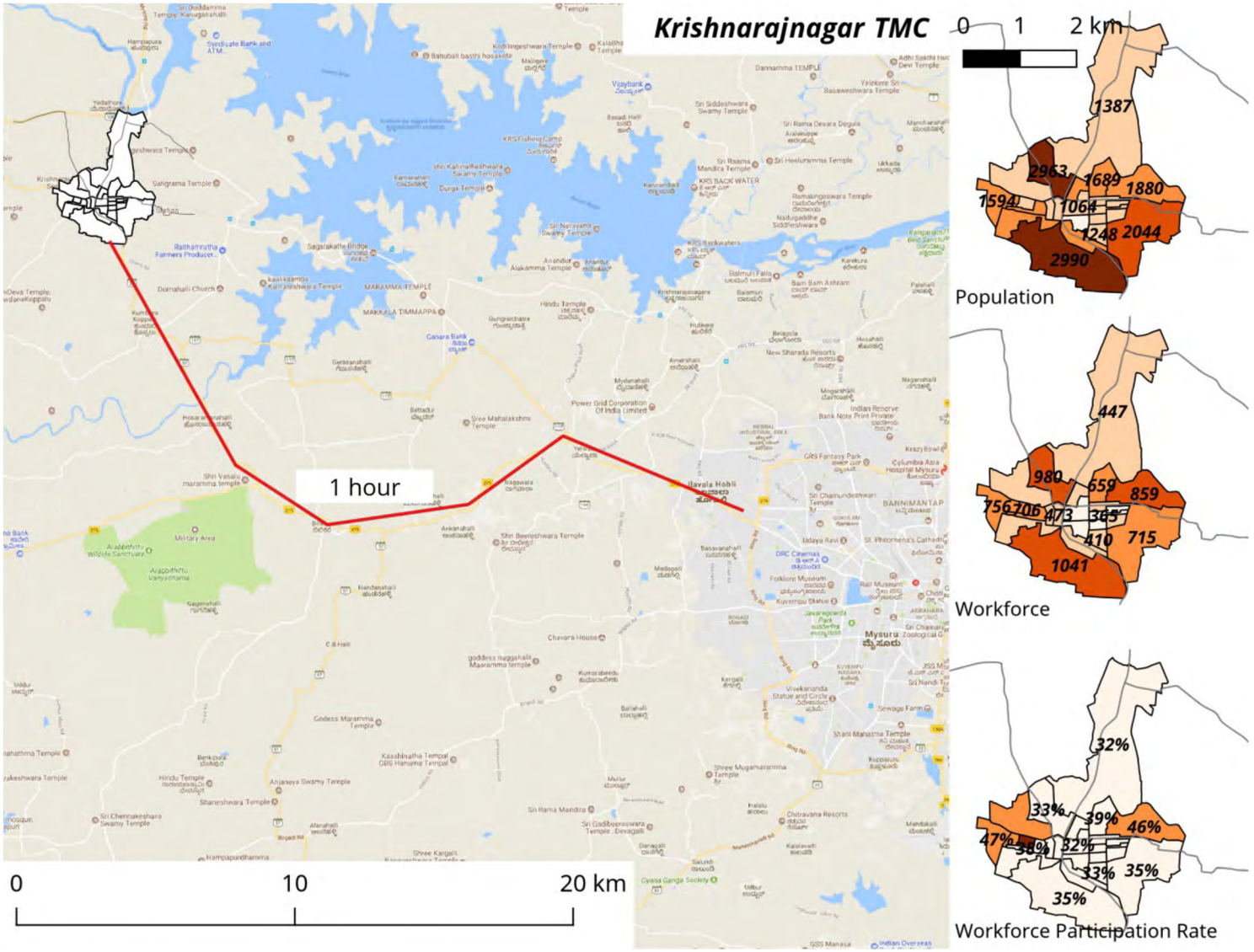


Figure 18: Spatial profile - Krishnarajnagar TMC

Krishnarajnagar Region

KR Nagar is located about an hour's drive from Mysuru, the dominant urban area in the region. It is very close to KR Sagara, the reservoir of the KR Sagara Dam.

Krishnarajnagara Town

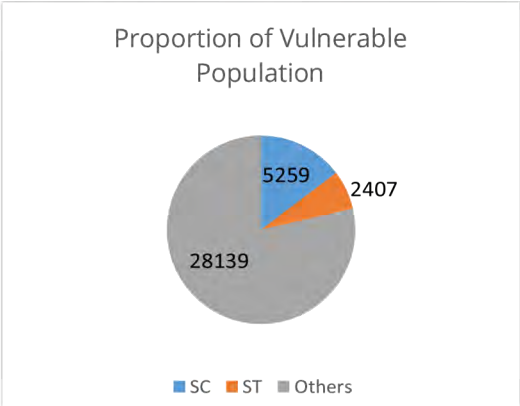
KR Nagar is a planned city developed in 1934 to accommodate the residents of villages that were inundated by the waters of the KR Sagar dam. It was designed by Hermann Gustav Krumbiegel – also the designer of the Lal Bagh Botanical Gardens in Bengaluru. The roads are broad and follow a grid pattern. Buildings generally have generous setbacks.

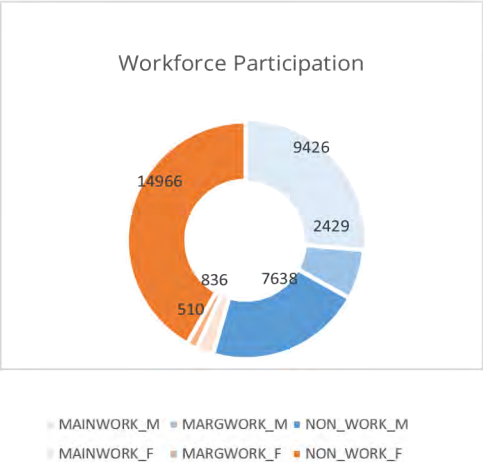
Economic profile

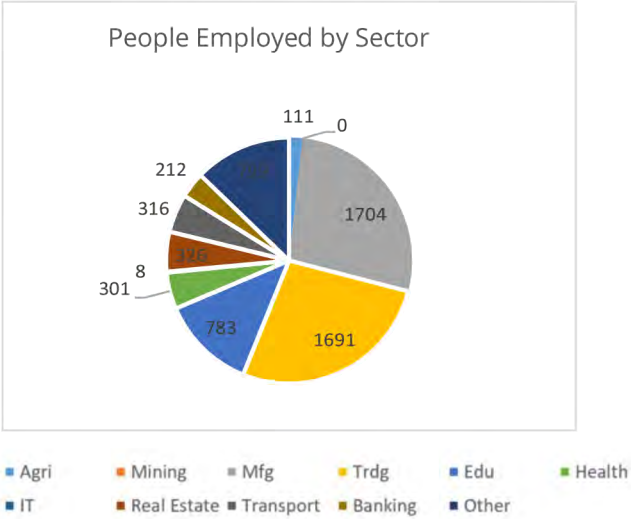
It is estimated that about 85 percent of the population depends on agriculture for their livelihoods. About 300—400 women travel daily to Mysuru to work in the garment factories there. Part of the district also moves to Coorg district in summer to work in the coffee plantations.

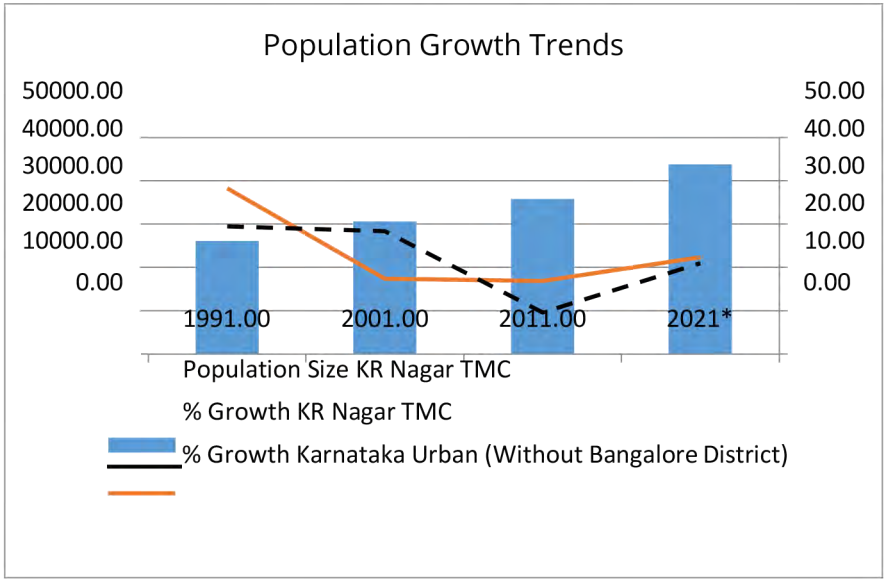
Krishnarajnagar TMC

Satellite Town *Vulnerable Population*









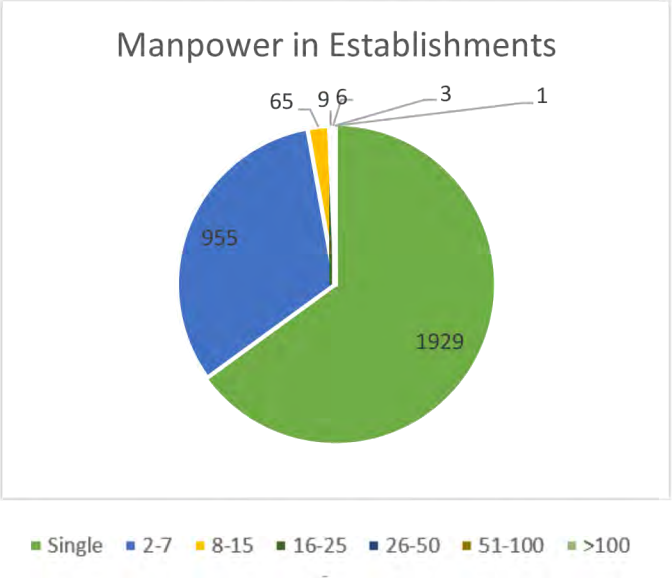


Figure 19: Demographic & Socio-economic Profile - Krishnarajnagar TMC

HDI & Environmental Profile - Krishnarajnagar TMC

Human Development Indices *Low HDI - Low FSI*

Taluk	Population of taluk	Urban population (%)	HDI	CDI	FSI
K R Nagara	252657	14.17	0.461	0.557	0.376

Environmental Risks *High Drought*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	4.83	3.58	2.69	1.79	5.15
2021	5.92	4.38	3.29	2.19	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	3.87	2.86	2.15	1.43	3.0
2021	4.73	3.51	2.63	1.75	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes Rs. lakh)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	7.51	9.2	16.5	111.64	8.49
Biodegradable (47%)	3.53	4.32			
Non-biodegradable					
Paper (8%)	0.61	0.73			
Plastic (9%)	0.67	0.83			
Rags (5%)	0.37	0.46			
Inert (25%)	1.88	2.31			
Others (6%)	0.45	0.55			

Table 7: Human Development & Environmental Profile - Krishnarajnagar TMC

Spatial profile - Lingasugur TMC

Lingasugur TMC

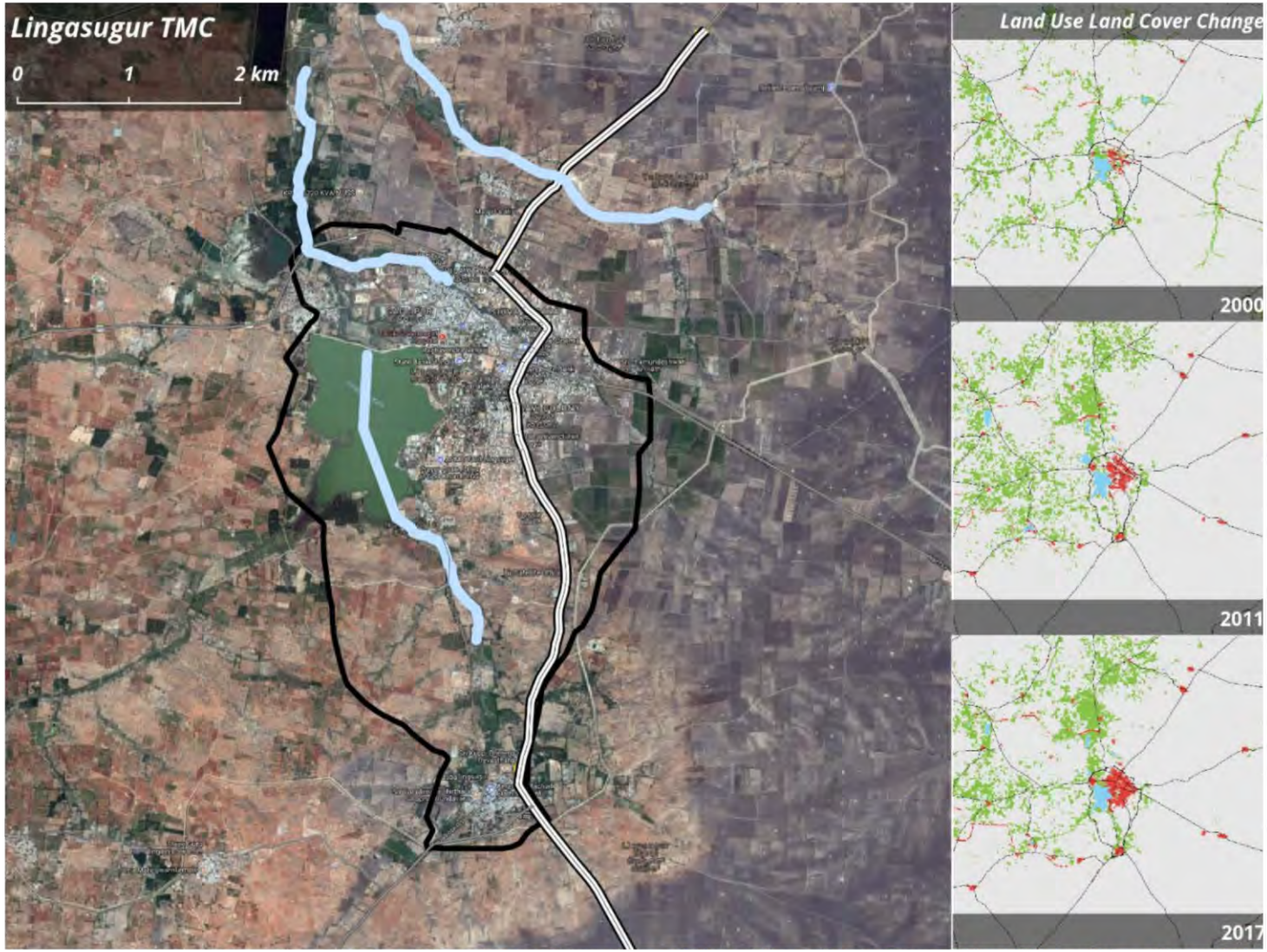


Figure 20: Spatial profile - Lingasugur TMC

Lingasugur Region

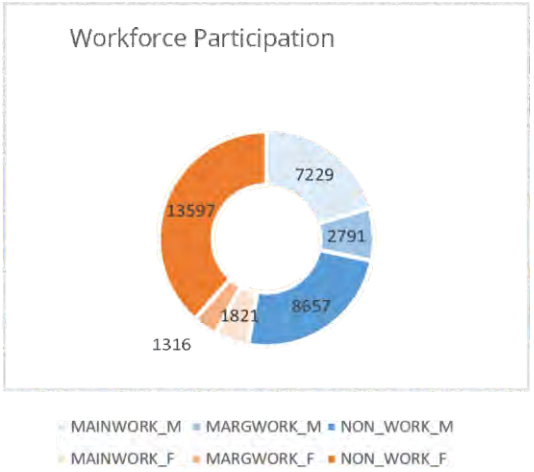
Lingasugur town is located on the junction of the Yadgir—Kushtagi and Raichur—Bagalkot highways. The two highways do not seem to have affected the spatial growth pattern of the town. Lingasugur has grown radially, around the main Lingasugur kere of the town. The town is also a centre for agricultural trade in the region.

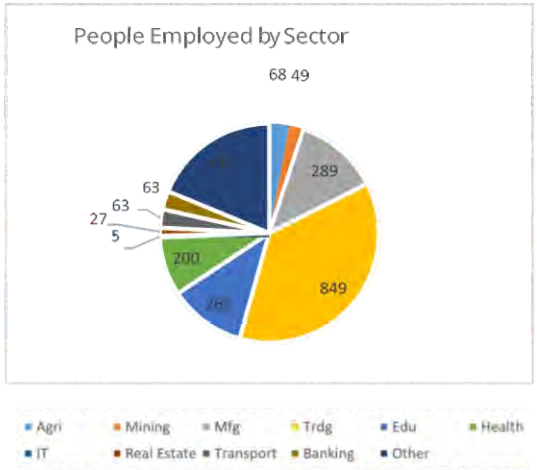
The town grew from the original settlement of Kasba, located about 2.5 km south of the current town centre during the British rule. The distance between the new town centre and the old settlement has led to an infrastructure delivery gap to in the old town.

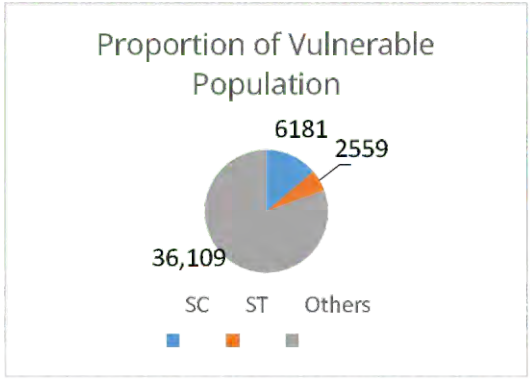
The Hatti (Hutti) gold mines are located within 30 minutes by road from the town. These mines are possibly the largest existing gold mines in the country. It is unclear if there is an employment and/or institutional linkage between the gold mines and the town of Lingasugur.

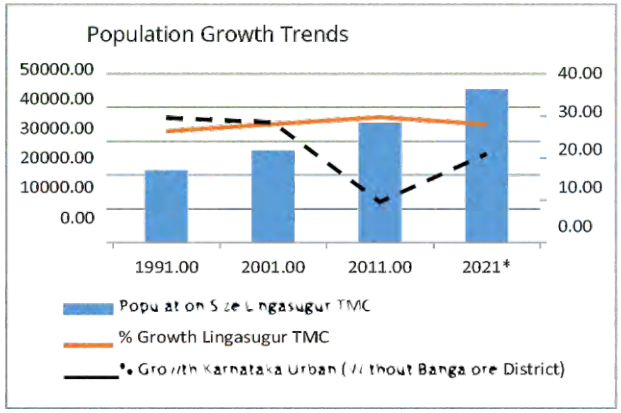
Lingasugur TMC *Vulnerable Population* *Agri-economy Linkage*

	SC	ST	Others
Male	3046	1260	13401
Female	3135	1299	13270
Total	6181	2559	17931









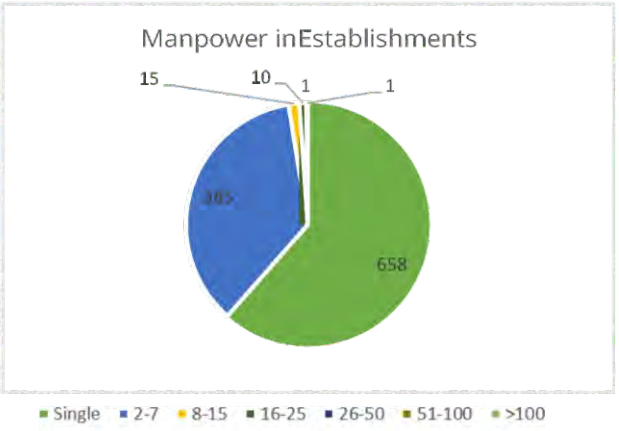


Figure 21: Demographic & Socio-economic Profile - Lingasugur TMC

HDI & Environmental Profile - Lingasugur TMC

Human Development Indices *Medium HDI – High CDI*

Taluk	Population of Taluk	Urban population (%)	HDI	CDI	FSI
Lingasugur	385762	9.18	0.647	0.750	0.507

Environmental Risks *Very High Drought Urban Food*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Very highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Urban floods: Frequency reported 2011, 2013- 2015

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	4.72	3.49	2.62	1.75	2.7
2021	6.12	4.53	3.40	2.27	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	3.77	2.79	2.10	1.40	0.0
2021	4.90	3.63	2.72	1.81	

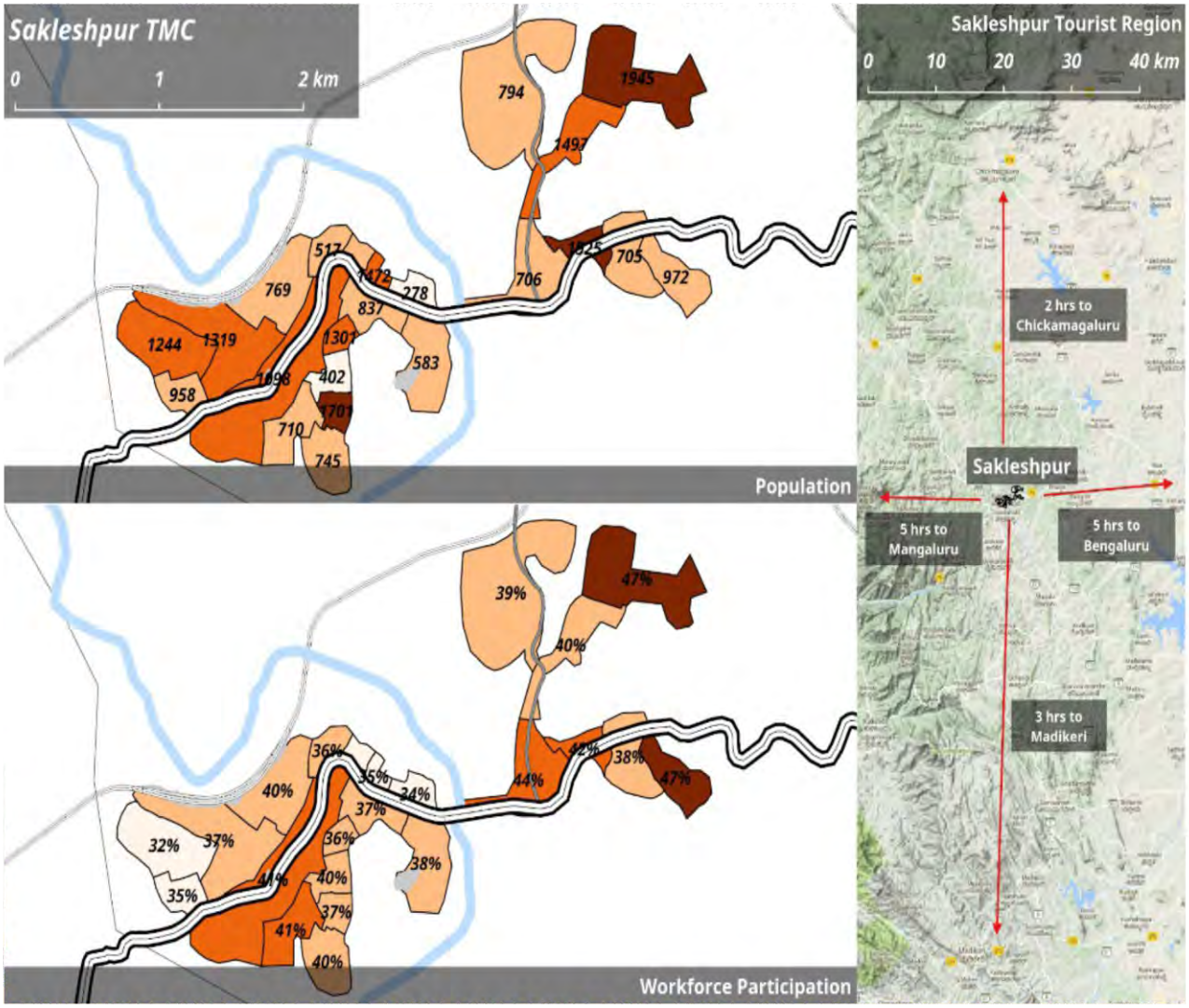
Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	7.33	9.52	0.0	75.9	0.0
Biodegradable (47%)	3.45	4.5			
Non-biodegradable					
Paper (8%)	0.58	0.76			
Plastic (9%)	0.66	0.86			
Rags (5%)	0.37	0.47			
Inert (25%)	1.83	2.36			
Others (6%)	0.44	0.57			

Table 8: Human Development & Environmental Profile - Lingasugur TMC

Spatial profile - Sakleshpur TMC

Sakleshpur TMC: *Nature Tourism* *Transportation Based Development*



Sakleshpur Region

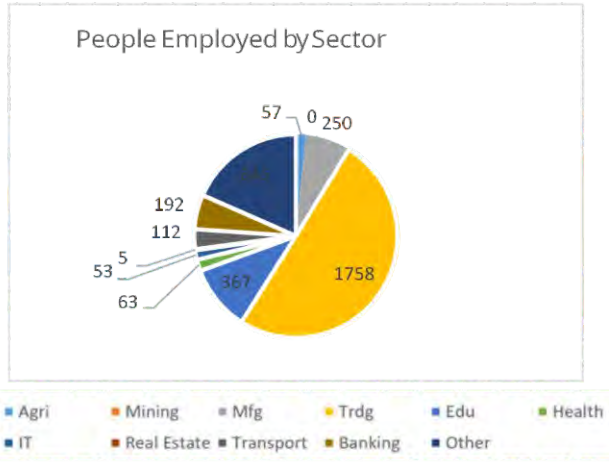
Sakleshpur is a hill station located in the Malnad region and is surrounded by the low rainfed hills of the Western Ghats. Agriculture in the region mainly comprises plantations of coffee, pepper and other spices. National Highway 48 which connects the port town of Mangaluru and the capital of Karnataka, Bengaluru, passes through the town making it highly accessible all year round. The railway line between these two cities also passes through Sakleshpur town. As a result, the town is a centre for plantation agricultural produce.

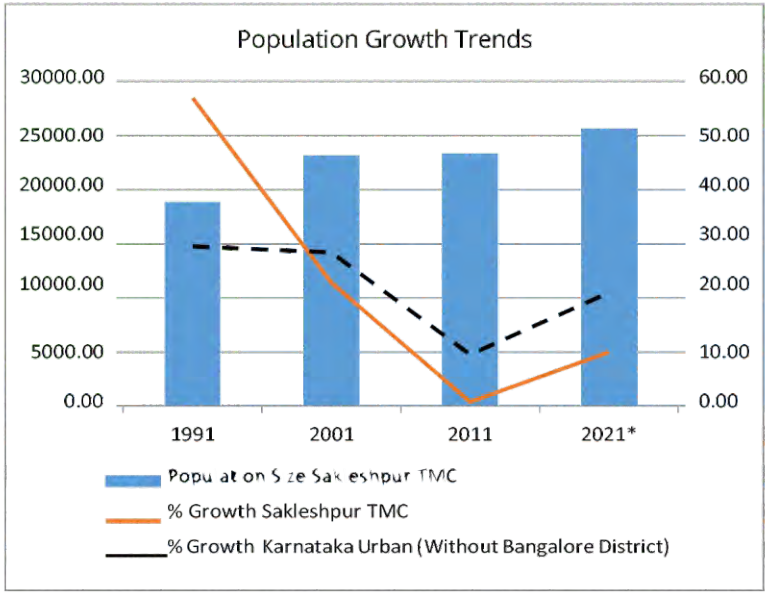
Sakleshpur attracts a large number of tourists, not only for its natural beauty but also because of the various religious sites in the town's vicinity. Most plantation estates and religious sites are located outside the town boundaries. Thus the town's connection to the main activities of the region is olny through wholesale and retial trade in its markets.

Figure 22: Spatial profile - Sakleshpur TMC

Sakleshpur TMC *Mono-economic Low*

	SC	ST	Others
Male	1355	101	10102
Female	1451	87	10256
Total	2806	188	17364





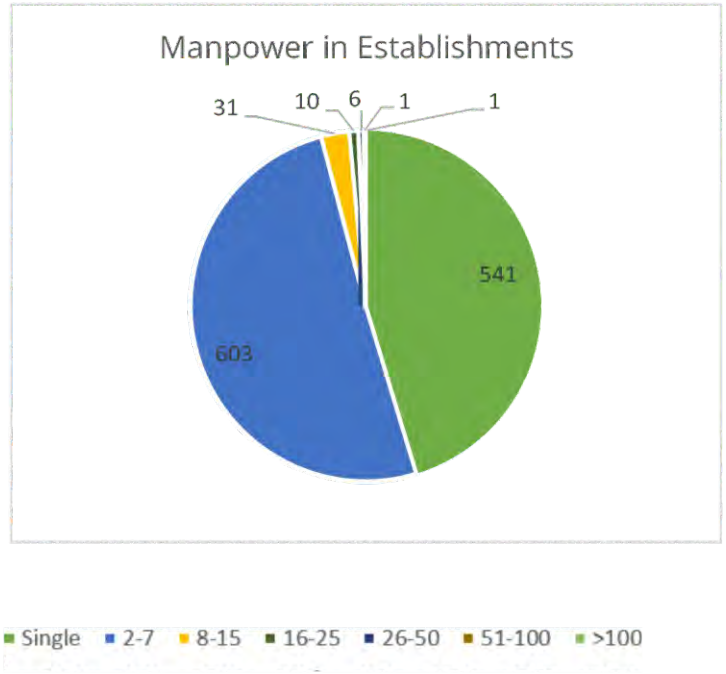


Figure 23: Demographic & Socio-economic Profile - Sakleshpur TMC

Human Development Indices *Medium HDI – Low CDI*

Taluk	Population of taluk	Urban population (%)	HDI	CDI	FSI
Sakaleshpura	128633	18.15	0.5974	0.499	0.515

Environmental Risks *High Landslide Moderate Wind and Cyclone Risk*

1. **Natural hazard vulnerability (taluk level)**

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Slightly vulnerable	Not prone to flood hazard	High	Zone II low damage risk zone	Moderate damage risk zone

2. **Manmade hazard vulnerability (ULB specific)**

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	3.15	2.34	1.75	1.17	2.4
2021	3.47	2.57	1.93	1.28	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	2.52	1.87	1.40	0.93	0.0
2021	2.77	2.05	1.54	1.03	

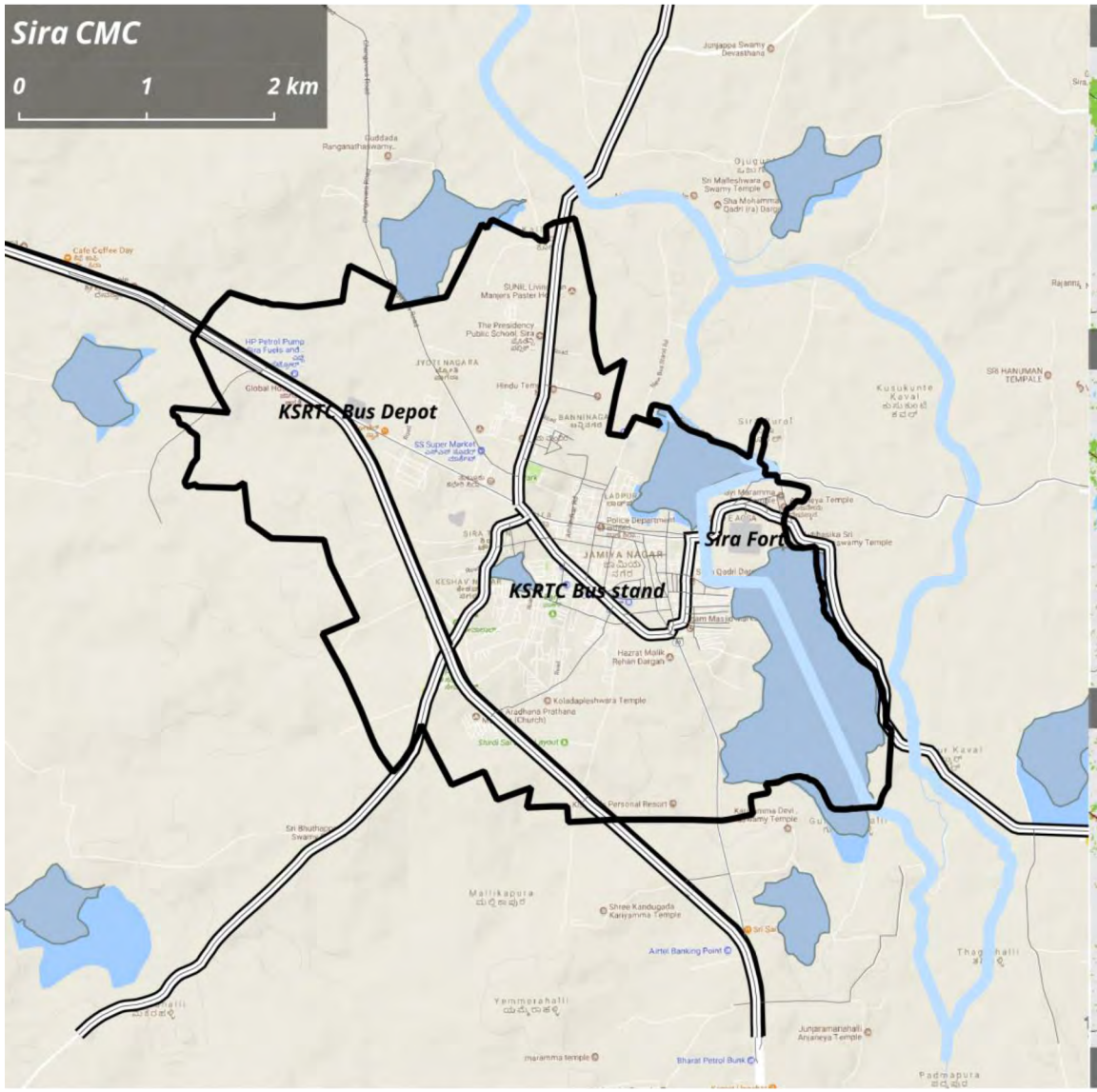
Status of solid waste management

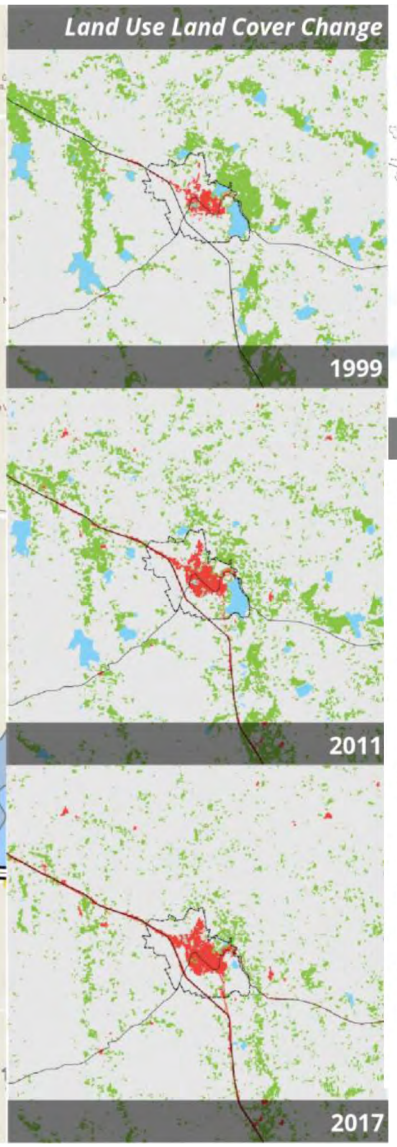
	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in Tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	4.9	5.4	12.0	93.7	0.0 (SWM unit was found in a dilapidated condition during field visit)
Biodegradable (47%)	2.31	2.51			
Non-biodegradable					
Paper (8%)	0.39	0.44			
Plastic (9%)	0.44	0.48			
Rags (5%)	0.24	0.28			
Inert (25%)	1.23	1.35			
Others (6%)	0.29	0.34			

Table 9: Human Devlopment & Environmental Profile - Sakleshpur TMC

Spatial profile - Sira CMC

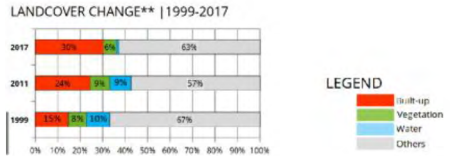
Sira CMC: *Transportation Based Development*





Sira region

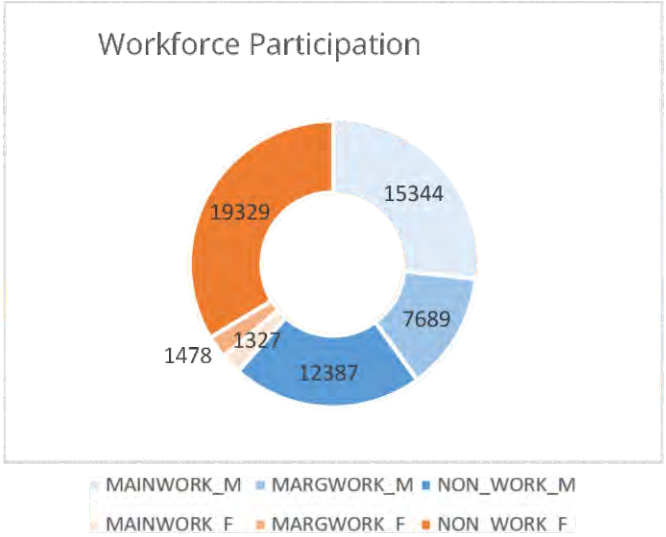
Sira town is located on the National Highway connecting Bengaluru and Mumbai/Pune. The east—west road connecting the town to Gauribidanur and thereafter to Ballari road also passes through the town. The town seen a growth along these corridors. The region and the town itself have a large number of water bodies of seasonal and perennial nature. The Outline Development Plan of Sira town aims to develop major residential areas along the National Highway.

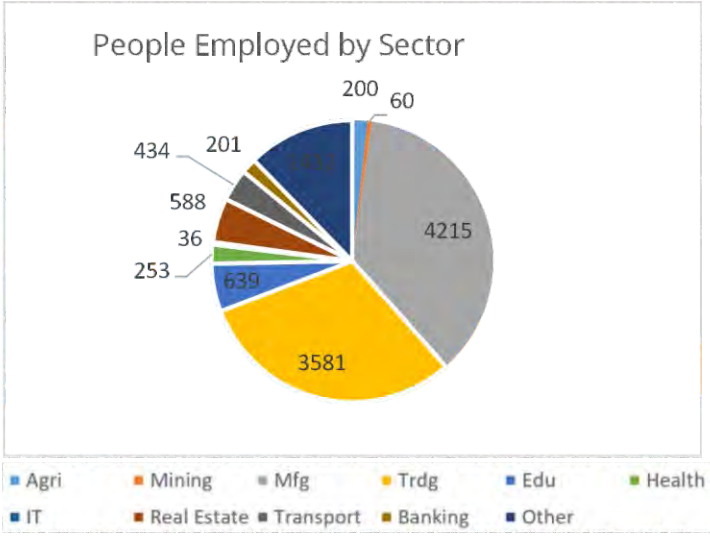


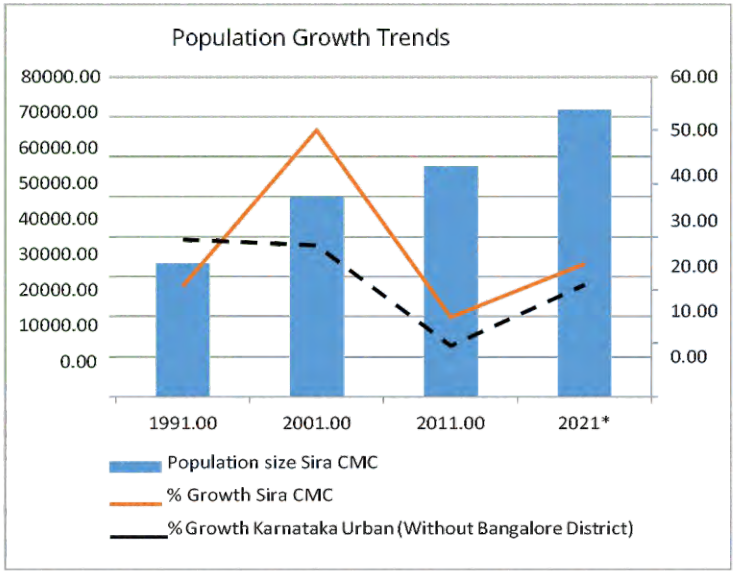
Data Source(s): IIHS Analysis,2018,USGS,OSM

Sira CMC *Mono-economic*

	SC	ST	Others
Male	4514	969	23575
Female	4440	1033	23023
Total	8954	2002	35642







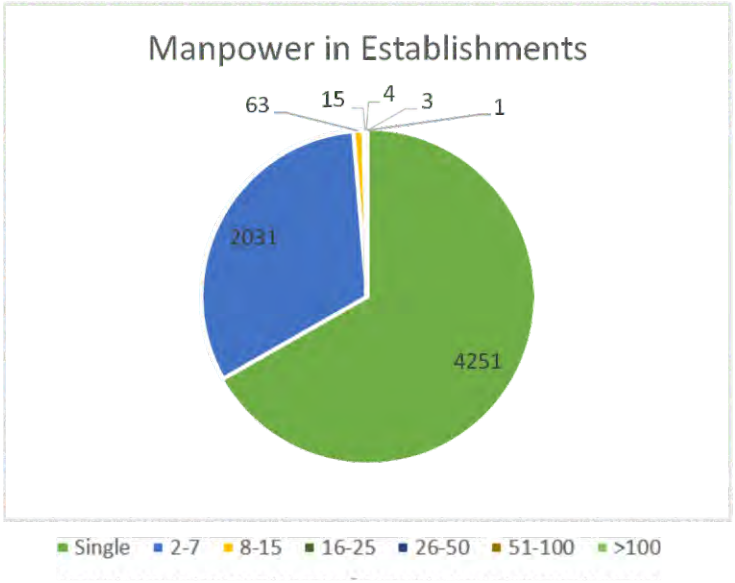


Figure 25: Demographic & Socio-economic Profile - Sira CMC

Human Development Indices *Low HDI – Low CDI*

Taluk	Population of Taluk	Urban population (%)	HDI	CDI	FSI
Sira	313758	18.34	0.425	0.498	0.374

Environmental Risks *High Drought Water Scarce*

1. Natural hazard vulnerability (taluk level)

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Very highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Low damage risk zone

2. Manmade hazard vulnerability (ULB specific)

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	7.76	5.75	4.31	2.87	4.9
2021	9.70	7.19	5.39	3.59	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	6.21	4.60	3.45	2.30	10.8
2021	7.76	5.75	4.31	2.88	(Proposed)

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	12.07	15.10	53.0	427.0	24.2
Biodegradable (47%)	5.67	7.09			
Non-biodegradable					
Paper (8%)	0.96	1.21			
Plastic (9%)	1.08	1.38			
Rags (5%)	0.63	0.75			
Inert (25%)	3.01	3.77			
Others (6%)	0.72	0.90			

Table 10: Human Development & Environmental Profile - Sira CMC

Spatial profile - Ullal TMC

Ullal TMC: *Satellite Town* *Transportation Based Development* *Nature Tourism*

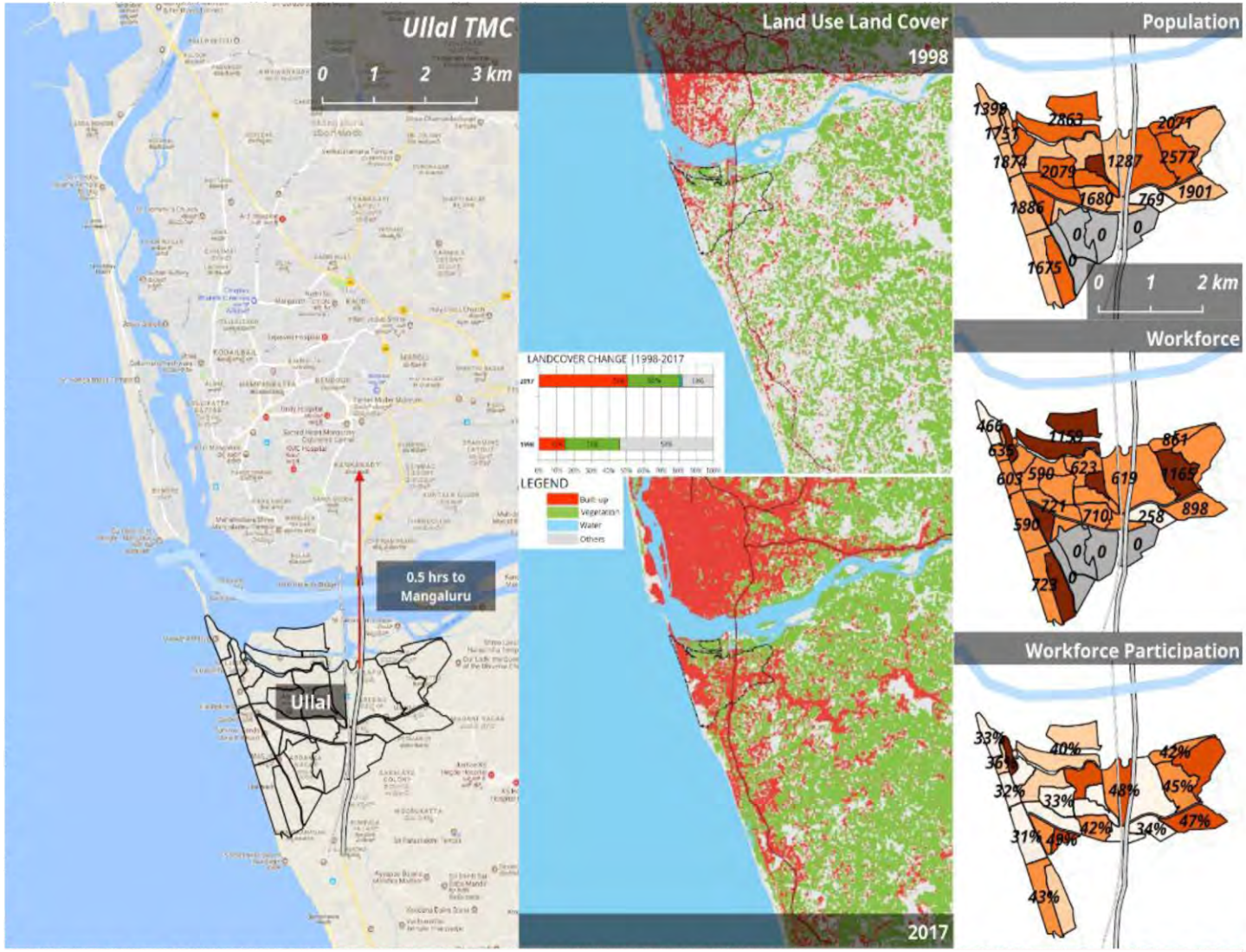


Figure 26: Spatial profile - Ullal TMC

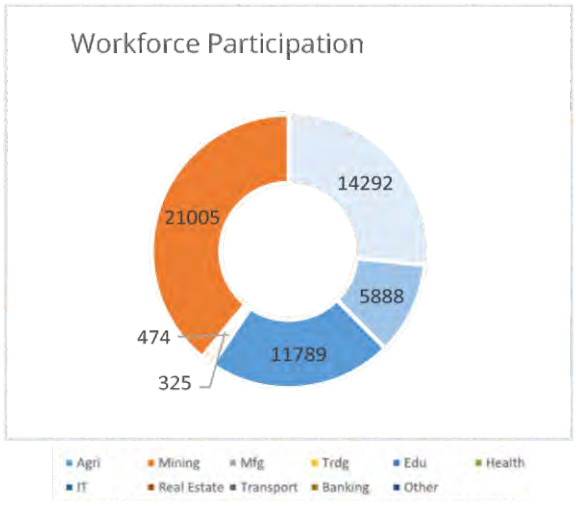
Ullal region

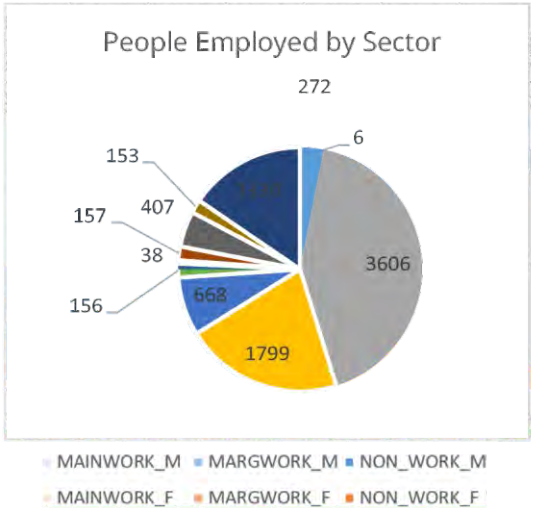
Ullal is a small town of about 15,000 households. It is one hour away by road from the city of Mangaluru, which is the dominant centre of trade, industry, commerce and education in the region. Given the proximity between Ullal and Mangaluru, the ULB has agreements with the Corporation of Mangaluru for water supply and solid waste disposal. Ullal is home to fish where fish oil and meat are extracted. These mills however contribute very little to the town's economy, except for providing employment. In the vicinity of the fish mills, there is a flourishing trade in river sand extracted from the Netravathi river, may or may not be legal.

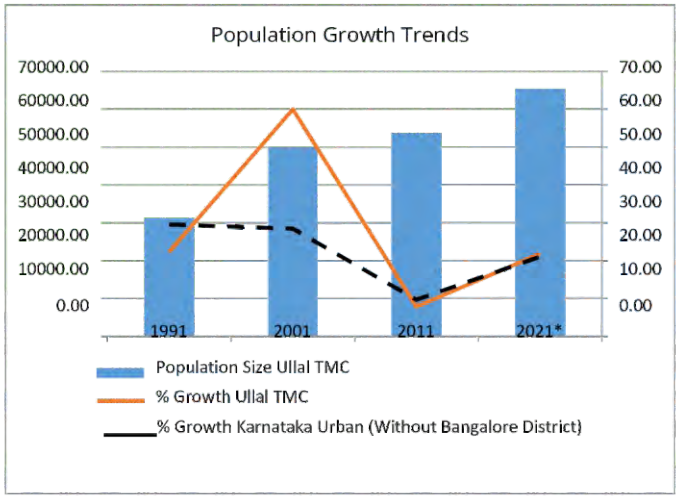
It seems that the town of Ullal receives significant remittances from its people working in the Middle East. This is reflected in a spurt of growth in the town's built-up area as well as the emergence of several apartment complexes.

Ullal TMC *Satellite Town* *National and Global*

	SC	ST	Others
Male	415	126	26014
Female	482	138	26598
Total	897	264	51451







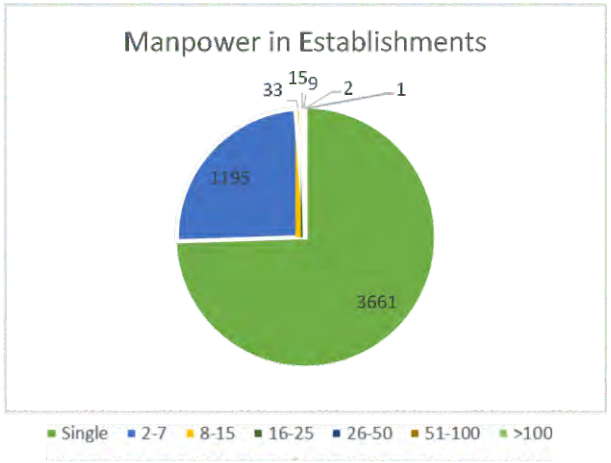


Figure 27: Demographic & Socio-economic Profile - Ullal TMC

HDI & Environmental Profile - Ullal TMC

Human Development Indices *High HDI – Medium CDI*

Taluk	Population of Taluk	Urban population (%)	HDI	CDI	FSI
Mangaluru	994602	78.88	0.83	0.559	0.603

Environmental Risks *Multi-hazard*

1. **Natural hazard vulnerability (taluk level)**

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Slightly vulnerable	Prone to Flood Hazard	Moderate to high	Zone III Moderate damage risk zone	Moderate damage risk zone

2. **Manmade hazard vulnerability (ULB specific)**

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	7.26	5.38	4.03	2.69	4.1
2021	8.84	6.55	4.91	3.27	

Waste water generation and treatment capacity

	Waste water generated (MLD				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	5.81	4.30	3.23	2.15	0.0
2021	7.07	5.24	3.93	2.62	

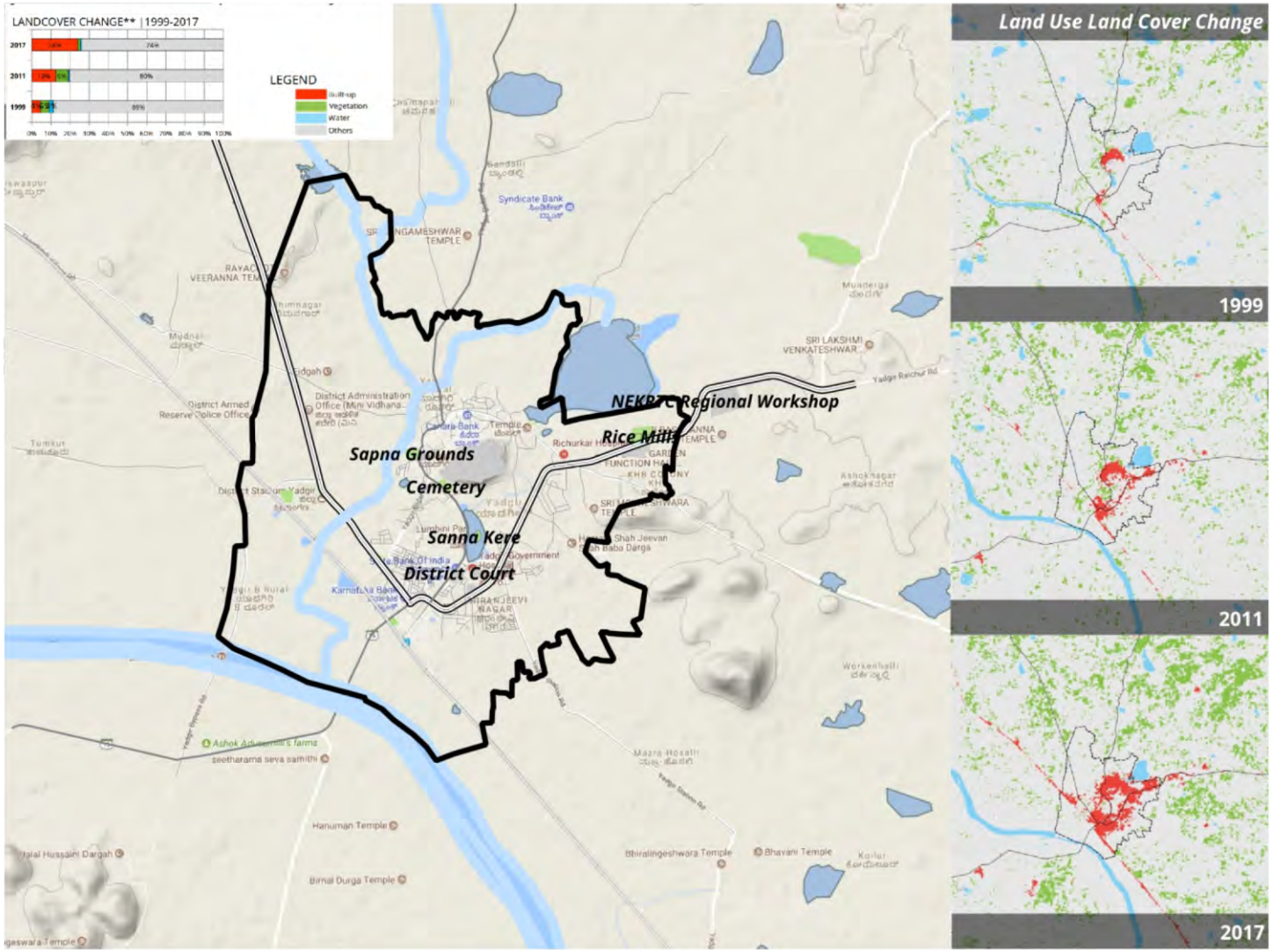
Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	11.29	13.75	14.5	10.85	23.5
Biodegradable (47%)	5.31	6.46			
Non-biodegradable					
Paper (8%)	0.91	1.11			
Plastic (9%)	1.01	1.24			
Rags (5%)	0.56	0.68			
Inert (25%)	2.82	3.43			
Others (6%)	0.68	0.83			

Table 11: Human Development & Environmental Profile - Ullal TMC

Spatial profile - Yadgir CMC

Yadgir CMC *Transportation Based Development*



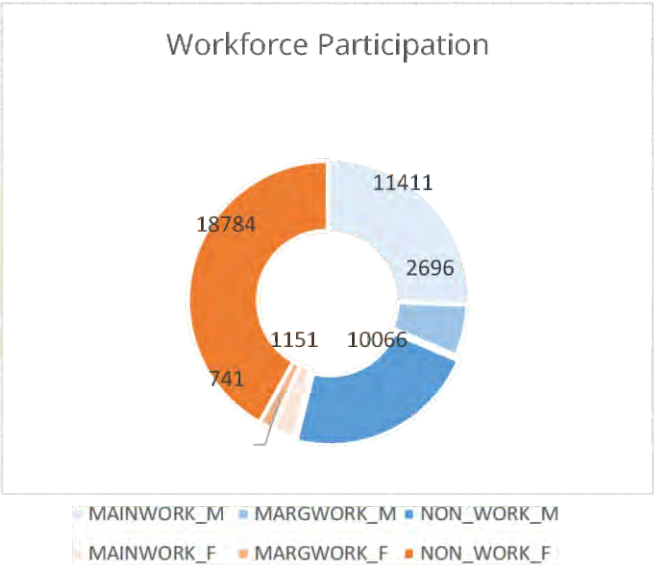
Yadgir region

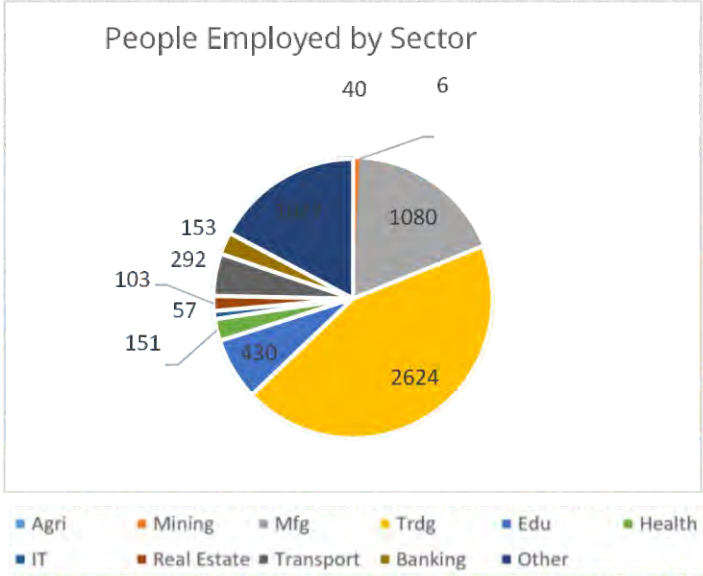
Yadgir town is centred around a hillock with a fort and is bounded on the South by the Bhima river. There are several seasonal and perennial water bodies in the city and its vicinity, providing the city with a fairly rich water resource base. The town has developed along the major transportation axes connecting it to Bidar and Raichur. Built up area is also seen along the railway lines heading towards Kalaburgi and Raichur. The master plan of the town for 2031 includes a ring/peripheral road just outside the municipal boundary.

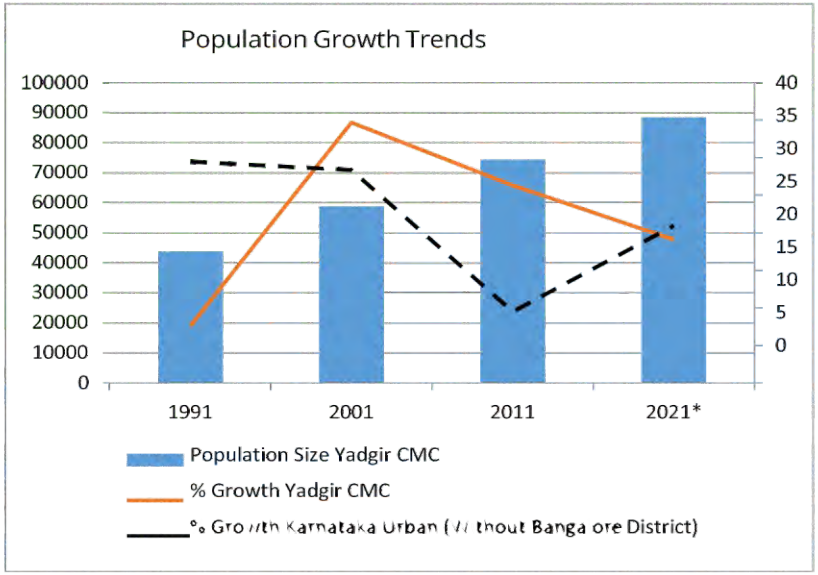
Figure 28: Spatial profile - Yadgir CMC

Yadgir CMC *Low Growth*

	SC	ST	Others
Male	6072	1940	28996
Female	6230	2083	28973
Total	12302	4023	41644







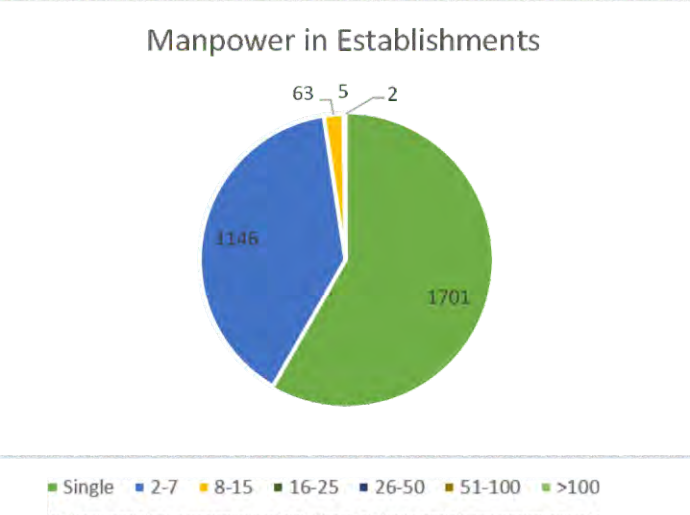


Figure 29: Demographic & Socio-economic Profile - Yadgir CMC

HDI & Environmental Profile - Yadgir CMC

Human Development Indices *Medium HDI – High CDI*

Taluk	Population of Taluk	Urban population (%)	HDI	CDI	FSI
Yadgir	398359	23.82	0.582	0.850	0.73

Environmental Risks *High Drought Moderate Wind and Cyclone Risk*

1. **Natural hazard vulnerability (taluk level)**

Drought	Flood	Landslide	Earthquake	Wind and cyclone
Very highly vulnerable	Not prone to flood hazard	Unlikely	Zone II low damage risk zone	Moderate damage risk zone

2. **Manmade hazard vulnerability (ULB specific)**

Water demand and availability

	Water demand (MLD)				Water availability (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	10.03	7.43	5.57	3.71	10.1
2021	11.95	8.85	6.64	4.42	

Waste water generation and treatment capacity

	Waste water generated (MLD)				UGD and waste water treatment capacity (MLD)
	@135 LPCD	@100 LPCD	@75 LPCD	@50 LPCD	
2011	8.02	5.94	4.46	2.97	0.0
2021	9.56	7.08	5.31	3.54	

Status of solid waste management

	2011 (tonne/day)	2021 (tonne/day)	Total capacity of vehicles (in Tonnes)	Total expenditure under SWM (in Rs. lakh)	Total revenue generated under SWM (in Rs. lakh)
Total solid waste	15.6	18.58	27.0	123.05	0.0
Biodegradable (47%)	7.33	8.73			
Non-biodegradable					
Paper (8%)	1.25	1.48			
Plastic (9%)	1.4	1.67			
Rags (5%)	0.78	0.94			
Inert (25%)	3.9	4.64			
Others (6%)	0.94	1.12			

Table 12: Human Development & Environmental Profile - Yadgir CMC

No. of Respondents by Annual Income (Rs '000)		Non-slum							Slum						
Type	**Town**	**20 – 30**	**30 – 50**	**50 – 100**	**100 – 500**	**>500**	**Not stated**	**(empty)**	**20 – 30**	**30 – 50**	**50 – 100**	**100 – 500**	**>500**	**Not stated**	**(empty)**
1-TMC	Bangarpet	23	9	4	1	1	2		3	4	2	1			
	Haliyal	19	9	2	6	4		1	10						
	K.R. Nagar	20	15					5	10						
	Lingasagur	2	9	20	9					7	3				
	Sakleshpur	8	13	13	6				2	5	3				
	Ullal	20	16	2			2		6	2	1	1			
2-CMC	Bidar	35	25	25	9			1	13	12	4				1
	Chamrajnagar	64	7	5	3		14	2	26					4	
	Sira	41	21	24	8	1			17	11	2				
	Yadgir		47	39	7	1		1		25	2				3
3-MC	Davanagere	9	40	53	37	8	2	2	19	18	13				
	Hubli-Dharwad	66	34	20	10	15	5		22	21	5		2		
Total Result		**307**	**245**	**207**	**96**	**30**	**25**	**12**	**128**	**105**	**35**	**2**	**2**	**4**	**4**

Table 13: Distribution of Respondents by Annual Income

Reported annual income data from the 12 ULBs shows a significant set of patterns and trends. First, there is a bias towards lower-income groups across all cities—significantly more households report low incomes than middle or higher incomes. Second, larger cities show a higher diversity of income groups, as may be expected. However, at the same time, with decreasing size of cities, the number of income groups also seems to diminish, leading to fewer higher-income group households in small cities. This trend is only broken by Bangarpet, whose economy is deeply linked to jobs in Bengaluru. This corroborates the vulnerable status of smaller cities arrived at from other socio-economic and environmental data presented in the typology section in Chapter 4 : City Profiles of this report.

Frequency and No. Of Hours of Water Supply		Daily					Once in Two Days				Once a Week			Less Than Once a Week		Not stated
Type	**Town**	**< 1 hr**	**1 – 2 hrs**	**2 – 6 hrs**	**6 – 24 hrs**	**Not stated**	**< 1 hr**	**1 – 2 hrs**	**2 – 6 hrs**	**6 – 24 hrs**	**< 1 hr**	**1 – 2 hrs**	**2 – 6 hrs**	**< 1 hr**	**1 – 2 hrs**	**Not stated**
1-TMC	Bangarpet			5	1			1	3	1			1			38
	Haliyal					51										
	K.R. Nagar	16					21	13								
	Lingasagur	50														
	Sakleshpur															50
	Ullal	3		3				4	8		1	1			1	29
2-CMC	Bidar	30	35													60
	Chamrajnagar	7	7	26			2	13	37		1	4	2			26
	Sira	58	17								2			27		21
	Yadgir	4	30				62	29								
3-MC	Davanagere		1					4			43	87	13	2	7	44
	Hubli-Dharwad	67	70				3				60					
Total Result		**235**	**160**	**34**	**1**	**51**	**88**	**64**	**48**	**1**	**107**	**92**	**16**	**29**	**8**	**268**

Table 14: Frequency of Water Supply

As may be expected, water supply service levels fall short of their benchmarks in these ULBs. The lower than average services, even within these 12 ULBs is a corroboration of the 'water-stressed' nature of the cities as elucidated in the section on typologies earlier in the report.

Service Level Improvements and Willingness to Pay		Non-slum						Slum					
		Water Supply—Change in Service Level			Water Supply—Willingness to Pay More			Water Supply—Change in Service Level			Water Supply—Willingness to Pay More		
Type	Town	Better	Same	Not Stated	Yes	No	Not Stated	Better	Same	Not Stated	Yes	No	Not Stated
1-TMC	Bangarpet	2	1	37	3		37		1	9	1		9
	Haliyal			41		41				10		10	
	K.R. Nagar			40	26	14				10	9	1	
	Lingasagur			40		40				10		10	
	Sakleshpur			40			40			10			10
	Ullal			40	1	1	38	1		9			10
2-CMC	Bidar			95			95			30			30
	Chamrajnagar	2		93	22	11	62			30	1		29
	Sira	1		94	95					30	13		17
	Yadgir			95		95				30	4	23	3
3-MC	Davanagere	2	7	142	70	51	30	1		49	29	7	14
	Hubli-Dharwad			150		150		21		29			50
Total		7	8	907	217	403	302	23	1	256	57	51	172

Table 15: Service Level Improvements and Willingness to Pay

An interesting picture emerges from Table 3. While there has been a meagre improvement in the water supply benchmark of the 12 ULBs (across small and large cities), there is evidence of a small but significant willingness to pay more for the service. This is more visible in the larger cities where, presumably, the opportunity cost of accessing water is higher.

No. of Respondents Reporting Improvement in Service Level (Waste & Drainage)		Non-slum								Slum							
		Waste Management Service Level				Drainage Service Level				Waste Management Service Level				Drainage Service Level			
Type	Town	Better	Same	Worse	NA	Better	Same	Worse	NA	Better	Same	Worse	NA	Better	Same	Worse	NA
1-TMC	Bangarpet	29	11			32	8			5	5			5	5		
	Haliyal	41				41				10				10			
	K.R. Nagar	25	15			6	34				10				10		
	Lingasagur	40				40				10				10			
	Sakleshpur	40				40				10				10			
	Ullal	38	2			25	15			9	1			7	3		
2-CMC	Bidar	95				95						30				30	
	Chamrajnagar	56	26	12	1	53	30	12		1	15	14		12	4	14	
	Sira	95				95				29	1			29	1		
	Yadgir	65			30	95				27	3			21	8	1	
3-MC	Davanagere	110	32	6	3	104	38	6	3	23	21	6		18	29	1	2
	Hubli-Dharwad	139		6	5	123	21	6		23	1		26	26	22	2	
Total		773	86	24	39	749	146	24	3	147	57	50	26	148	82	48	2

Table 16: Improvement in Waste and Drainage Service Levels

By and large, significant improvements seem to have been made by the ULBs in waste management and drainage. Hearteningly, this is across slum and non-slum areas, demonstrating an equitable distribution of developmental gains within the city.

Willingness to Pay More for Municipal Services		Non-slum		Slum	
Type	**Town**	**Yes**	**No**	**Yes**	**No**
1-TMC	Bangarpet	39	1	7	2
	Haliyal		41		10
	K.R. Nagar		40		10
	Lingasagur		40		10
	Sakleshpur		40		10
	Ullal	22	18	4	6
2-CMC	Bidar		95		30
	Chamrajnagar	33	62	15	15
	Sira	95		12	18
	Yadgir	30	65		30
3-MC	Davanagere	73	78	5	45
	Hubli-Dharwad	5	145	27	23
Total		**297**	**625**	**70**	**209**

Table 17: Willingness to Pay for Municipal Services

About half the respondents in non-slum areas, and a third of respondents in slum areas are willing to pay more for better services. This may signify a combination of aspiration towards, and a willingness to contribute to basic service provision. While this willingness is more prevalent in larger cities (perhaps due to the higher opportunity costs of accessing basic services), it is an adequate indicator that a movement towards reliable services in exchange for rational tariffs may lead to significant trust building as well as better developmental outcomes for cities and their residents.

Typology Matrix

	TMC						CMC				Corporation	
	Sakleshpur	Haliyal	Lingasugur	KR Nagar	Bangarpet	Ullal	Sira	CR Nagar	Yadgir	Bidar	Davanagere	HDMC
Vulnerable population			X	X	X							
LowHDI		X		X			X					
Mono-economic	X	X					X					
Waterstressed			X	X	X		X	X	X	X		X
Disasterprone	X	X	X			X				X		X
Satellitetown				X	X	X		X				
Urbansprawl				X	X					X	X	X
Informal economy	X	X	X	X		X	X	X	X	X	X	X
Tourism	X					X		X		X		
Tradingtown	X	X	X	X	X			X	X	X	X	X
Manufacturing town		X		X		X	X				X	
Educationhub											X	X
Transportation baseddev	X				X	X	X		X			X
Highgrowth										X	X	X
Agri-economy linkage	X	X	X	X								

Table 18: Typology Matrix

The Typology Matrix

The typology matrix in Table 6 shows some interesting trends. These trends largely reinforce the 'big city bias' that Indian urbanisation has been seeing over the years. Each of the studied 12 ULBs have been categorised under different typologies based on certain criteria. This has been illustrated in Table 7. Some key trends that can be observed are as follows:

1. Smaller cities are facing higher vulnerability

The smaller towns with Town Municipal Councils like Sakleshpur, Haliyal, K.R.Nagar, Bangarpet and Ullal are the ones with higher vulnerable populations, low HDI indices, reliance on a single economic source and environmental stress. This in turn, has various implications on other factors such as out migration, poor quality of life and potentially huge expenditure on public health.

2. Smaller cities are also showing less potential to develop

Smaller towns are in a disadvantaged position when it comes to the potential to able to develop. While all of the study towns are largely trading towns, there is little potential in terms of education, other employment opportunities, and other avenues for development like tourism. Given that most of these small towns are still in a transition phase from rural to urban or are predominantly rural in terms of the occupation and geography, they rely heavily on the agriculture based industry. They either act as the market place for produce from the nearby villages, or are processing units for agricultural raw material. There is relatively little potential for export and linkages with larger markets. This lack of opportunity also causes natives from these towns to move out. Another factor that leads to stagnation in the smaller towns is their proximity to a bigger city. K.R.Nagar, Bangarpet and Ullal are examples for this.

3. Larger cities are magnets for seasonal and permanent migration:
The three larger towns Bidar, Davanagere and Hubli-Dharwad show higher potential for growth and lower vulnerability. They act as local attractors or magnets for people from nearby towns and villages. Davanagere and Hubli-Dharwad, being a part of schemes like AMRUT and the Smart City Mission, are also seeing greater investment of government money.

4. Informal trading is a key activity across classes of cities:
The dominance of informal trading in their economy does not change across all 12 ULBs. There is a huge disparity in the number of people working as per Census 2011 and the number of people working in registered establishments as per the Shops and Establishments Data collected for Karnataka in 2013-14.

Based on the typologies that have emerged, the recommendations have been prioritised. While some are based on what applies best to each city type, most recommendations are relevant and applicable across the 12 ULBs.

Typology	Source	Criteria
Vulnerable Population	Census 2011	Cities where SC+ST population is more than 20% of the population the average for urban Karnataka is 16%
Low HDI	Human Development Report (Government of Karnataka, 2014)	As per UNDP - Human Development Report 2016, Indian Standards: High- 0.78 and above Medium- 0.56- 0.79 Low- below 0.55
Mono-economic	Business Establishments in Urban Karnataka (Directorate of Economics and Statistics, Government of Karnataka, 2013-14); Field visits and interviews	Largely field visits and interviews because the establishment data shows that most cities are dominated by trade and that might not be the best indicator.
Water Stressed	Service Level Benchmarks (SLB) data from KMDS; Field interview with ULB officials	135 LPCD
Disaster prone	Drought vulnerability assessment of Karnataka at Taluk level (KSNMDC,2017); Vulnerability Atlas of India (BMTPC, 2002); District Disaster Management Plans (Government of Karnataka, 2016)	Classification of hazard proneness as per the published documents.
Satellite Town	GIS maps; Field visits and interviews	Existence of a city with more than 1 lakh population within 50 kms; Good transit connection to this city
Urban Sprawl	Land use and land cover maps; Density of population from Census overlaid on the ULB map showing the wards	Inner city areas with relatively high vacant lands; dispersing of the built-up area
Informal Economies	Business Establishments in Urban Karnataka (Directorate of Economics and Statistics, Government of Karnataka, 2013-14); Census 2011	Less than 50% of the working population registered
Tourism	Secondary data; Field visits and interviews	Existing potential in terms of nature and other existing heritage such as temples and other monuments

Trading Towns	Business Establishments in Urban Karnataka (Directorate of Economics and Statistics, Government of Karnataka, 2013-14)	More than 35% of the workforce engaged in establishments that deal with trading
Manufacturing Towns	Business Establishments in Urban Karnataka (Directorate of Economics and Statistics, Government of Karnataka, 2013-14); Field visits and interviews	More than 25% of the working population engaged in manufacturing
Education Hubs	Field visits and interviews; Secondary data	
Transportation Based Dev	GIS maps	At the intersection of roads connecting major cities People settling along these development corridors
High Growth	Census 2011	Population projections using Geometric method from 1981
Agricultural Economy Linkage	Field visits and interviews; Secondary data	

Table 19: Criteria for Typologies

Chapter 5: Recommendations

Recommendations | Governance

Bridging Workshops for Municipal Planning

Introduction & Background

The implementation of the 74th Constitutional Amendment Act in Karnataka's ULBs is limited. There are very few instances of active Area Sabhas or even Ward Committees. The prescribed process of listing of problems by Area Sabhas and citizens leading to a prioritisation of issues at the Ward Committee level has been a non-starter. A critical component of the process—consensus on a resource mobilisation strategy—is no one's priority. Therefore, the tasks of identification of problems, prioritisation of issues, planning and development of solutions and resource mobilisation, are assumed by sectoral state agencies such as the Karnataka Urban Water Supply and Drainage Board(KUWSDB), Electrical Supply Companies(ESCOMs), Public Works Department(PWD), and other departments and line agencies such as education, health and horticulture. These agencies align their objectives and methods with state or central funding as available, and do not have overt reasons to engage with local issues, priorities and resources (such as for operation and maintenance).

Rationale

In such a scenario, localisation of issues and development planning is at best represented in the working of the 'Standing Committees' of the ULBs. However, there is a need to integrate concerns and capacities of the city and its citizens, as represented by the Standing Committee, with the missions of other departments and line agencies. This can be done through regular integration exercises involving the ULB's Standing Committee, the ULB's executive, and other departments and line agencies active in the city, such as KUWSDB, local distribution companies (DISCOMs), the Karnataka State Pollution Control Board(KSPCB), the PWD, Karnataka State Road Transport Corporation(KSRTC), and departments such as health and family welfare, education, horticulture, forests and tourism.

Recommendation

It is proposed to curate and conduct regular 'Bridging Workshops' between the ULB and the line agencies. The workshops could be conducted at least every three years, structured by the CMAK or other identified institutions with expertise in the fields of urbanisation. If required, the workshops could be held under the guidance of the district administration, in order to align with district level visioning processes and/or the DPC's plans.

The purpose of these workshops would be to develop a 'Municipal Plan' with the following section

- Stock taking of existing infrastructure, and the city's capacities (eg, availability of fresh water, land for solid waste management, etc.)
- Visualisation of the problems and concerns of the city using maps
- Identification of priority areas for intervention
- Consolidation of solutions proposed by citizens and elected representatives
- Budget analysis including a financial outlay, options for local resource mobilisation, and potential investments from public and private enterprises

The recommendation is for all Karnataka ULBs. The exercise could be started in Town Panchayats (TPs), TMCs and CMCs, since smaller towns are more directly linked to the district economy and planning process, which already have participative planning processes in place. It could be piloted in the TMCs in this study, to understand its efficacy and finalise a structure.

Recommendations | Land Leverage

Inner City Redevelopment

Introduction & Background

Some of the cities being studied show lower residential densities in the central part of the city, and higher towards the outside, leading to a situation of 'urban sprawl'. In bigger cities such as Davanagere and Hubli-Dharwad, it may be argued that the central parts of the cities may be used for more commercial activities such as Central Business Districts (CBD), while people prefer to stay in the periphery for lesser congestion load and a cleaner environment. But at the same time, GIS maps developed by the DMA under the Asha Kiran Mahithi (AKM) and Rajiv Awas Yojana (RAY) reflect a fair amount of vacant land in and around the core of the city. As can be seen in the maps below, the total vacant land identified in Davanagere and Hubli-Dharwad is approximately 1,700 and 7,800 acres, respectively.

Vacant Land - Davanagere

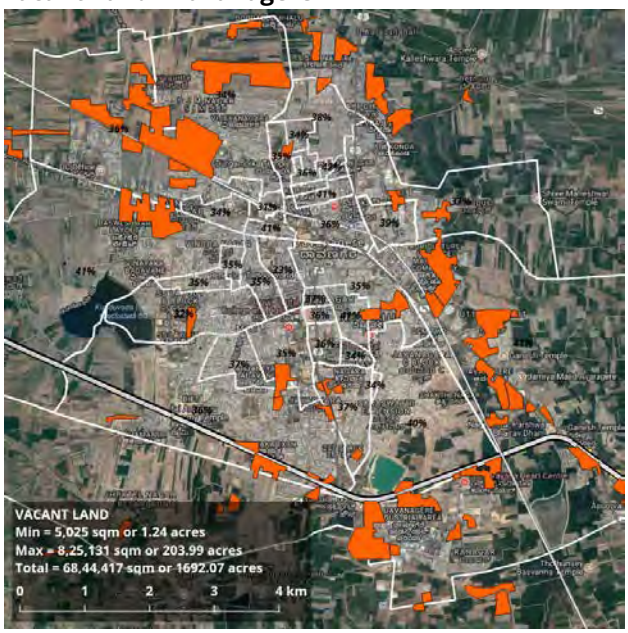


Figure 30: Vacant land in Davanagere,Source: DMA

Vacant Land - Hubli-Dharwad

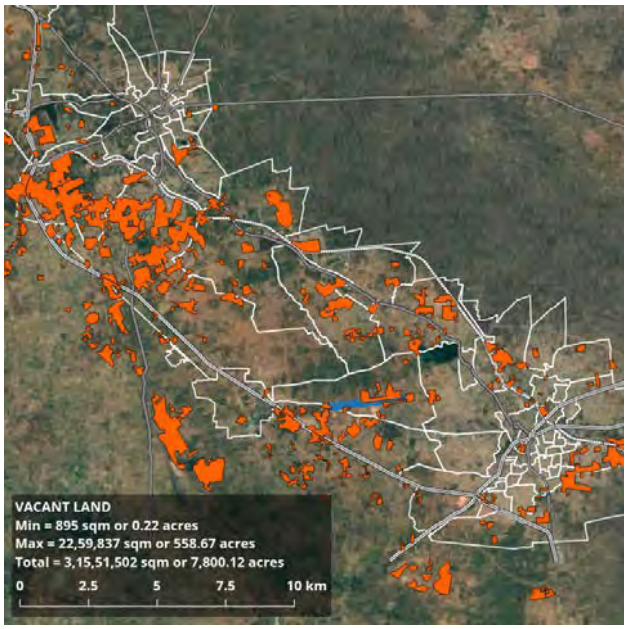


Figure 31: Vacant land in Hubli-Dharwad, Data Source: DMA

Rationale

Some of these lands may have significant commercial value, and a portion of these may be made available for public purpose. At the same time, a significant level of basic infrastructure (even if old) may already exist in these locations in or near the city centre. It can be further argued that while residential areas for the upper middle- and higher-income groups can be acceptably planned in the periphery, residential areas for lower middle and lower income groups, need to be planned in the city centre, along with commercial areas that generate jobs. This will allow for lesser cost and opportunity cost burden on these groups for accessing employment.

Recommendation

The key of the recommendation is to rejuvenate, re-densify and redevelop these vacant lands by leveraging their land value and unused or under-utilised infrastructure. This will be done in order to make use of those areas which are already commercially viable, by increasing density and bringing in mixed land use. The approach to the redevelopment of these lands would be to leverage private capital through Joint Ventures (JV) and Public Private Partnerships (PPP). In such an arrangement, the ULB or government could contribute land, and the private partner and/or developer could leverage debt or equity in order to fund the development.

Based on the terms of the agreement or concession, the private partner and/or developer would hand over certain portions of the development to the ULB and may be allowed a long lease of at least 30 years on the rest. The 'Swiss Challenge'[1] method may be followed for the

[1] Swiss Challenge- A Swiss Challenge is a method of bidding, often used in public projects, in which an interested party initiates a proposal for a contract or a bid for a project. The government then makes project details publicly available and invites proposals from others interested in executing it. On the receipt of these bids, the original contractor gets an opportunity to match the best bid.

procurement of the private partner and/or developer, in order to let the market, suggest the best mix of uses that land can commercially support. The ULBs portion of the development may include affordable housing, community facilities and allocations of land for decentralised waste and waste water treatment infrastructure.

However, it is critical to note that in order for the ULB to be able to give its land out on a lease for a term longer than five years, an amendment to the two municipal Acts (KM & KMC Acts) may be required. In the Karnataka Municipal Corporations Act 1976, an amendment to 'Chapter XII: Property and Contracts, Section 176: Disposal of Property and Interest Therein, Sub-section 6' is recommended to allow the Corporations to take decisions for long term leases up to 60 years without the prior approval of the state government.

Case/Sample

A simplified case for Davanagere is illustrated in the table below:

Head	**Value**	**Formulation**
Vacant land (DMA GIS map)	1,700 acres	
Vacant land available	85 acres	5% of vacant land
Vacant land available	3,43,825 sqm	1 acre = 4045 sqm
Local Floor Area Ratio (FAR) available	1.75	
Buildable area	6,01,693 sqm	FAR x Plot Area
Built area transferred to ULB	2,00,000 sqm	1/3rd of the built area
Cost of the development	1,800 Cr	Construction cost @ 30,000 Rs/sqm
Value of assets transferred to ULB	600 Cr	1/3rd of the total asset created
Market rate for local sale of real estate	60,000 Rs/sqm	About 5,500 Rs/sqm
Income of the private partner/developer	2,400 Cr	Sale rate x built up area of developer
Private partner/developer's ROI	33%	Profit / Cost

Table 20: Sample for revenue generation from use of vacant land

Converting Slums on ULB Land to Rental Housing

Introduction & Background

A large number of slums (both declared, notified and non-notified) are on ULB lands. In the 12 ULBs identified for the study, the ownership of slum lands (by number of households) is illustrated in the table below:

Source: DMA – Asha Kiran Mahithi

City/Town	Local Body	State Government	Government of India other than Railways, Defence and Airport	Private	Others	Total
Bidar	12,209					12,209
Davanagere	6,826	4,511		1,621		12,958
Sira	6,816	392		1,206		8,414
Hubli-Dharwad	5,865	4,691	431	19,125	7,505	37,617
Yadgir	5,473					5,473
Lingasugur	3,013					3,013
Bangarpet	944	327		1,008		2,279
Haliyal	605	595		190		1,390
KR Nagar	455			2,039		2,494
Sakleshpura	122	60		1,197		1,379
Chamrajnagar	97			6,910		7,007
Ullal				338		338
Total	**42,425**	**10,576**	**431**	**33,634**	**7,505**	**94,571**
% of Total	*44.86%*	*11.18%*	*0.46%*	*35.56%*	*7.94%*	*100.00%*

Table 21: Number of Households in Slums by Land Ownership

What options exist for governments to address slum households living on public land? Could the now seemingly inevitable cycle of eviction and relocation be rethought to address the vulnerability and 'illegality' of these households, as well as municipal finances? Evicting and relocating separate households from their livelihoods, crippling their capacity to develop or sometimes even survive. Persistent insecurity of tenure discourages household investments in health and education. This is particularly true of renters in slums, a third of all slum households, who often get overlooked even within the most ambitious of slum development schemes.

Rationale

Slums have two physical assets. First, the ULB's land; and second, the housing unit, which is clearly an investment made by the household. Currently, both assets are effectively devalued because the ULB cannot claim or leverage its land easily, and the housing unit is considered illegal. However, security of tenure, even if for a limited time, allows households to invest in their housing units and reap developmental gains in health, education, and income.

The Ahmedabad Slum Networking Programme has proven that such no-eviction guarantees for about ten years or so lead to higher levels of income and better health and education outcomes.

At the same time, the ULB's land asset is not able to generate any revenue for its rightful owner. Most importantly, even with central and state schemes for housing, it will be a long time before the allocations reach the massive populations living in slums across small towns.

Recommendation

In the proposed model, the ULB gives security of tenure to the household by signing a 'land rent' agreement with the occupying household, in return for rent on the land occupied. Households remain 'owners' of the housing unit and become 'renters' of the land. They would therefore, also be free to retain their tenants as before, who would then become 'sub-tenants'. The ULB maintains the ownership of its land and generates rent revenue.

It may be argued that locations where there are slums on public and/or ULB land have complex claims and subversive interests. Further, it may be argued that occupying public land is an offence and needs to be penalised rather than condoned. However, two counter arguments emerge in the analysis of the situation—firstly, that it cannot be said that all occupations of public lands are offensive in nature, as they in fact may represent an effort of the citizens to provide housing for themselves in adverse circumstances characterised by a dire lack of adequate and affordable housing options. Secondly, all towns need not have complex claims, especially smaller towns with less speculative land markets and reduced real estate interests. Further, the status quo of neither the land owner (the ULB) nor the occupier (the slum dweller) benefiting substantially and sustainably from the land, needs to be challenged.

Lastly, it is important that, a) ULBs assert their claims over their own land or risk losing it to spiralling land market speculation, and b) two planning permissions and overall master plan compliance may not be immediately possible in such locations, and should be thought of incrementally.

However, as discussed in the earlier section, in order for ULBs to be able to give land out on lease for a term longer than five years, an amendment to the two municipal Acts (KM & KMC Acts) may be required. For this case, in the Karnataka Municipalities Act 1964, an amendment to Chapter III: Transaction of Business by the Municipal Council, Section 72: Competency of Municipal Council to Lease, Sell and Contract, Sub-section 2 is recommended to allow the ULBs to take decisions for long term leases for up to 10 years.

Case/Sample

As per the recommendation, only TMCs and CMCs have been considered for the illustrative calculations. Further, it is assumed that only about half of the slum households occupying ULB lands may be eligible for the land rent model, and that only towns with a large number of slum households on ULB lands will be interested in pursuing this model. If a nominal average rent of Rs 500 is charged for the occupation of the land, then the ULB could gain the following revenues:

City/Town	Slum Households on ULB land Eligible for Land Rent Model	Annual Rent (Rs 500 per month)	Annual Revenue (Rs Lakh)
Bidar CMC	6,000	6,000	360
Sira CMC	3,000	6,000	180
Yadgir CMC	3,000	6,000	180
Lingasugur TMC	1,500	6,000	90
Bangarpet TMC	500	6,000	30
Total	**14,000**		**840**

Table 22: Annual Revenue for Select ULBs from Land Rent from Slum Households. Source: IIHS Analysis

Premium to be Charged on Third Party Transactions on Municipal Properties

Introduction and background

Large extents of public land have been leased out to private individuals, trusts, societies and other organisations for both residential, commercial and leisure purposes. In many instances, these lands are further sub-leased to or managed by a third party. It can be argued that many of these lands should now be valued at much higher rates than when they were originally leased out. However, the benefit from these third-party transactions only accrue to the third party lessee and not to the original lessor government (central, state or ULB). Given the weak financial health of the ULBs in Karnataka, the benefit from these transactions, if tapped upon, can be a source of revenue for them. This will depend upon the extent of the ULB land and buildings that are already under lease, as well as land that may be leased out under any of the recommendations on inner city redevelopment or land rent model for slums.

Precedent & Rationale

A bench of the Bombay High Court recently (3 May, 2018) declared two amendments made in 2016 to the Maharashtra Land Revenue Code (MLRC) as constitutional, legal and valid— the addition of Section 37A, and amendment to Section 295. These sections empowered the government to allow the transfer or assignment of lease-hold rights of government lands, and also issue permits to charge and recover from the lessee, the unearned income from second and subsequent transactions like sub-leasing and renting.

('Leasehold land' refers to land that belongs to the Urban Local Body which is given out on lease for a number of years, even in perpetuity for a rent, and 'unearned rent is what a lessee earns from giving rights over a leased plot, which is akin to a profit that the ULB has not earned. It is essentially the difference between sale price and the occupancy price paid to the ULB.)

The rationale given for these amendments was that public interest and public revenue cannot be sacrificed by allowing government lands to be used and occupied for long periods of time without any benefit or income to the state.

Recommendation

Such an Amendment in the case of Karnataka would entail the collection of premium, transfer fees and a share of profits over a change of assignment of plots taken on lease from the ULB. This may be extended to cover ULB buildings currently on lease or rent. For enabling this provision for ULBs, the following Acts and Rules will need to be amended in order to include a provision for charging a premium on 'unearned rent' on the second and subsequent transactions on land and properties leased out by the ULB:

Karnataka Municipalities Act, 1964; and Karnataka Municipal Corporations Act, 1976
[Possible] Land Revenue Code

Recommendations | Green Jobs

Green Jobs for Local Economic Development and Sustainable Infrastructure

Introduction and Background

Skills and knowledge are the driving forces of economic growth and social development for any country. Karnataka has always been known as a pioneer in innovations. This has enabled the state to bring into play a wide range of national and multi-national corporates and organisations to contribute to its overall development. Yet, it has been observed that there lies a huge gap between the demand and supply of skilled labour for these corporates and organisations. At the same time, there is an increasing focus and thrust of the central and state governments on promoting green businesses, a green economy, green infrastructure and develop sector-specific competencies and skills.

These activities are intended to help accomplish the objectives of the national and state urban missions, and schemes such as Atal Mission for Rejuvenation and Urban Transformation (AMRUT), the National Solar Mission, Power for All, Swachh Bharat Mission, Green India Mission, Smart City Mission, and also achieve the targets of the country's Intended National Determined Contribution (INDC) to the United Nations. In effect, convergence is sought between missions and targets on climate change.

IIHS' assertion that a ULB will be as prosperous and financially sustainable as the city can be, leads us to attempt an approach to such a convergence through a two-pronged strategy—jobs in the city that support sustainable infrastructure, thereby addressing the concerns of local economic development and urban resilience.

Green Jobs

Decent jobs that contribute to preserve or restore the environment, both in traditional sectors such as manufacturing and construction and in emerging green sectors such as renewable energy, energy efficiency, waste management, etc. (ILO, 2013) are central to sustainable development. These jobs can respond to the global challenges of environmental protection, economic development and social inclusion. The key drivers for green jobs are Skill India Mission, National Urban Livelihood Mission, Kaushalya Karnataka Mission, and can be enabled through the Government of Karnataka's Department of Skill Development and Entrepreneurship & Livelihood.

Current Scenario and Inference

In Karnataka, the number of youth requiring vocational education from 2017 to 2030 is projected at 1.88 crores, comprising 75 lakh of existing workforce in 2016 and 113 lakh fresh

entrants (Economic Survey of Karnataka, 2017). These two groups consist of informal workers in agriculture and non-agriculture sectors, school dropouts, those completing secondary and higher secondary education and young women looking for work.

Around 55% of the state's population is in the age group of 20 to 59 years and the expected incremental demand for people to work is 8.47 million skilled persons by 2022 (Planning and Statistics Department, 2017). The Karnataka Knowledge Commission reports that the three sectors that provide a majority of the jobs to the skilled workforce are:

- Tourism
- Information technology, biotechnology and environmental sciences and
- Construction

There is potential for these sectors to create green jobs.

Rationale

The efforts to promote green businesses in urban areas and to create employment opportunities in the sector will help enhance resource efficiency and build low-carbon sustainable societies. According to the International Labour Organisation (2012), at least half of the global workforce—the equivalent of 1.5 billion people—is affected by the transition to a greener economy and the transformation to a greener and low-carbon economy could generate up to 60 million additional jobs across economic sectors. The report further states that the following positive outcomes are possible through encouraging green businesses and jobs:

- Improvement in water management
- Improvement in energy and raw materials efficiency
- Limiting greenhouse gas emissions
- Minimising waste and pollution
- Protecting and restoring ecosystems
- Supporting adaptation to the effects of climate change
- Management of public health.

Recommendation | Green Mobility in Urban Areas

The transport sector contributes significantly to greenhouse gas emissions and air pollution. It uses over a quarter of the world's energy and is responsible for a comparable share of global CO2 emissions from fossil fuel combustion. Government policies at the central and state levels are increasingly encouraging the introduction of non-motorised transport, electric vehicles and bio-CNG vehicles as a way to offset the negative impacts of transportation systems.

Non-motorised Transport (NMT): The use of private vehicles, especially 4-wheelers, not only puts a huge pressure on the road infrastructure of a city, but also has a negative impact on the environment. The National Urban Transport Policy 2014 as well the AMRUT mission supports the promotion and development of NMT such as cycling and walking as a way to alleviate the problem of congestion in cities, and at the same time encourage a healthy lifestyle among urban residents. India's commitment to the Paris Agreement to reduce emissions per unit of GDP as well as the New India @ 2022 Vision aims to make the nation inclusive for the poor, middle class and women. In the mobility sector, this can be achieved through development of green mobility systems supported by para-transit systems and NMT infrastructure.

Through these drivers, green jobs can be created in NMT, especially in small and medium towns. These could include producing, operating and maintaining fleets of para transit vehicles like e-rickshaws and a public bicycle sharing service, like 'Trin Trin' in Mysuru.

The jobs that could be potentially created range from maintaining and servicing bicycles and their hubs, supply of parts and cycling gear, to developing infrastructure including digital platforms like mobile applications for running the system.

Electric Vehicles: The National Electric Mobility Mission Plan 2020 undertaken by the Government of India has the potential to bring about a transformational paradigm shift in the automotive and transportation industry in the country. The manufacture and maintenance of electric vehicles and systems is expected to provide a significant number of green jobs.

Bio-CNG Vehicles: As an alternative to Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) that are used as motor fuels, a significant amount of Bio-CNG can be produced from biodegradable organic matter at the municipal level. Collection of cattle dung and the organic component of municipal waste, and its efficient use for Bio-CNG production can possibly replace more than 4 million tonnes of LPG per year (SCGJ). The potential areas and quantum for job creation in green mobility are:

1. Manufacture of green mobility solutions
2. Servicing and maintenance
3. Management information systems and banking support

Area of Work	Assumptions	Jobs - TMC	Jobs - CMC	Jobs – City Corporation
NMT	20 bicycles per 1,000 population for 20% of the population (ITDP, YYYY)	6-8	13-15	20-25
Electric Vehicles	@10 % adoption	10-15	25 -35	50-100
Bio-CNG	Depends on the acceptance by the city	-	-	30-45

Table 23: Potential for job creation from green mobility

Recommendation | Sustainable Solid Waste & Waste Water Management

Issues in municipal solid waste and waste water management are reaching critical levels in most towns and cities. Large amounts of municipal solid waste and waste water (often completely untreated) is reaching the environment directly around towns and cities. As of now, there is very limited capacity to safely dispose solid waste in Karnataka's towns and cities. At the same time, about 3,777 MLD of waste water (sewage and sullage) is generated in about 219 ULBs of the state. The currently installed treatment capacity in the state is about 1,304 MLD, and it is estimated that about 2,473 MLD of sewage is discharged into the local environment without any treatment (BWSSB, 2017). A part of the issue is also connected to demand management of water and conservation practices.

Water management, including conservation through rain water harvesting, combined with treatment and management of sewage is a critical component of urban environmental services that can support the sustainable development of a city. Strategic water management can lead to a rationalisation of demand for fresh water, which is particularly pertinent for water stressed urban areas of the state. At the same time, sustainable water management and waste water treatment practices can lead to the growth of a job market through the planning, development and management of sustainable infrastructure.

It is estimated that sustainable practices such as rainwater harvesting, shallow well digging, and planning, implementation and management of sewage treatment plants

(including decentralised waste water treatment systems) may lead to the following levels of job creation across size classes of towns:

Area of Work	Assumptions	Jobs – TMC	Jobs – CMC	Jobs – Corporation
RWH systems installation and maintenance	if 70% households comply with the building bye-laws	50	70-400	800-1600
Shallow well digging	Depending on households with space	40-50	65-200	400-1000
Planning, implementation and management of STPs and decentralised waste water treatment facilities	@ 1 STP and 1 FSTP in TMC @ 1STP and 2 FSTP@4 STPs and 8-12 FSTPs in Corporations	6 -10	8 -15	36-50

Table 24: Potential for job creation from sustainable water management practices

Similarly, sustainable solid waste management practices are estimated to lead to the generation of the following jobs in a city or town:

Area of Work	Assumptions	Jobs – TMC	Jobs – CMC	Jobs – Corporation
Home Biogas	If adopted by 5% of households	13-15	50-55	75-150
Community Biogas plant	Slums, bulk waste generators such as hotels and private layouts. TMC- 2 Units CMC-6 Units Corporations – 8-15 units			
Aerobic compost units	Assuming 3 per ward	75-80	96-100	120-200
Electronic waste processing	@1 for TMC and CMC and 3-5 units for Corporations	10	10	30-50
Cloth bag stitching	Potential dependent on banning plastic and promotion of cloth bags by way of tie-up with SHGs			

Table 25: Potential for job creation from sustainable and centralised solid waste management practices

Recommendation | Urban Farming

Urban forestry and farming including roof top gardening is an increasing trend in urban households and institutions. Not only does urban farming lead to the production of vegetables locally, it also contributes to the reduction of heat island effect and helps in generating carbon sinks in urban areas. The potential areas and quantum for job creation in the sector of urban farming are:

- Permaculture, gardening and nursery management (ULB lands)
- Soil and nutrient supply
- Household level service providers for setting up and maintenance of roof top gardens, permaculture units and vegetable gardens

Area of Work	**Assumptions**	**Jobs – TMC**	**Jobs – CMC**	**Jobs – Corporation**
Urban forestry and garden/park maintenance (ULB level)	15 green spaces in TMC 25 green spaces in CMC 50-75 green spaces in Corporations	30	50	100-150
Urban permaculture/ farming/rooftop gardening (household level)	If 10% households adopt	50	70-400	800-1600

Table 26: Potential for job creation from Urban farming

Recommendation | Rooftop Solar Power Generation

India's growing renewable energy sector is likely to generate more than 330,000 new jobs over the next few years creating opportunities to support mainly the country's poor. With the transition to a low carbon economy, and in keeping with the Intended Nationally Determined Contributions (INDCs), India has a target of getting to 60 Giga Watts(GW) of Wind and 100 GW of Solar. The sector is booming and more people are needed to make the transition possible and profitable. The potential areas and quantum for job creation in the sector of Rooftop Solar (RTS) power generation are:

- Manufacturing and assembly of solar panel modules, charge controllers, inverters, converters, and end use components such as energy efficient pumps, LED DC/AC bulbs and DC/AC energy efficient fans
- Installation and maintenance (medium and small scale)
- Repairs and component replacement such as batteries, charge controllers and inverters
- Manufacture, assembly, installation and maintenance of control systems and automation

Area of Work	Assumptions	Jobs – TMC	Jobs – CMC	Jobs – Corporation
Rooftop Solar Photo Voltaic hardware	If 10% households adopt RTS	50-60	100-150	500-1500
Solar pumps to lift water to overhead tanks	If 10% households adopt solar pumps	30-40	65-100	400-1000
Town/city level RTS, solar street lights and solar lights for parks	If ULBs adopt solar power strategy for street and public space lighting	10-15	15-20	300-800
Street vendors for lighting during night		30-35	50-75	1000 -3000

Table 27: Potential for job creation from solar energy

Note on Capacity Building & Skill Development for Green Jobs

Several channels are available from the central and state governments to finance training and capacity building of citizens in the technical and managerial aspects of green jobs. The National Skill Development Corporation (NSDC) has several lines of funding available under the Skill India mission. At the same time, the Government of Karnataka has also instituted a range of policy and financial supports for skill building for green jobs.

However, there are several issues with respect to the actual roll out of such programmes and the eventual absorption of the skilled workforce into meaningful and decent jobs in the sustainable development sector. One of the key issues with the process is the perception of 'service jobs', that many sections of society may not consider to be aligned to their aspirations. In order to address this perception question, it is important to ensure that these trainings include significant value additions beyond skill building and employment linkages.

One of the key approaches in order to enable this would be to link this training with aspirational and growth enabling conditions for the trainees. It is recommended that these skill building programmes be supplemented by 'value-added training' on life skills required for a socio-economic growth oriented future. Some of these value added trainings could include:

- Language training (for example in English)
- Computer literacy and skills (especially for children of the trainees)
- Accounting and book-keeping (to enable entrepreneurs)
- Communication & soft skills

Besides accessing Central or state level funds, Corporate Social Responsibility (CSR) funds could be channelled in to support the above activities. Further, ULBs can enable linkages with teaching fellowship programmes from the private sector in order to acquire the required expertise.

Eventually, it is expected that the overall design of the training programme, including the value addition that it can bring to the trainees' socio-economic trajectory can go a long way in ensuring its success.

Conclusion

This study of the 12 ULBs with the approach that a 'healthy city leads to a healthy ULB' and vice versa has led to some interesting results. Multiple typologies have emerged from an analysis of the economic, social and environmental characteristics of these cities and towns. A thorough understanding of the typology matrix reinforces the big city bias that urbanisation in India has seen over the years. It can be seen that the smaller towns like Sakleshpur, Haliyal, K.R.Nagar, Bangarpet and Ullal are facing higher vulnerability, economically and environmentally. They need immediate attention in terms of employment generation and off setting of negative environmental impacts. They are also the towns where steps need to be taken to smoothen their transition from rural and semi-rural to urban. Opportunities like tourism need to be explored and special focus to make satellite towns more self-reliant need to be taken. The larger cities like Bidar, Davanagere and Hubli-Dharwad, on the other hand, are local attractors or magnets for seasonal and permanent migration. When grouped into a typology they also fare better in the human development and economic indicators. These are the cities where steps need to be taken to tackle higher population growth and along with that leverage the opportunities that are available.

The recommendations based on analysis of both primary and secondary data, have been prioritised based on the profiles that have been created for each of the cities. Two recommendations that could specifically apply to the bigger towns are a) Rejuvenating and revitalising the inner city areas b) Converting slums on ULB lands to rental housing.
The other recommendations could be applied to most of the cities that are being studied. They include a) Conducting bridging workshops for the development of a Municipal Plan b) Charging a premium on third party transactions of Municipal Properties c) Generating green jobs in the areas of urban mobility, solid waste management and urban farming.

The typologies and prioritisation of recommendations are expected to act as a framework to similar analyses of other ULBs within Karnataka. There is scope for further research by which this data and approach can be extrapolated to all the ULBs of Karnataka. A comprehensive index developed using the socio-economic and environmental indicators that have been studied here will make it possible to development typologies for other cities as well and then give recommendations for their holistic development, most importantly their financial sustainability.

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Annexures

Annexure 1: Geometric increase method for population projection

$$P_n = P\,(1+ I_G/100)^n$$

Where, I_G = geometric mean (%)

P = Present population

N = no. of decades.

Annexure 2: Tags given to the ci ties based on 4 key aspects

Spatial Attributes

- *Satellite Town*
- *Urban Sprawl*
- *Transportation Based Development*
- *Nature Tourism*

Demographic Attributes

- *Vulnerable Population*
- *High Growth*

Economic Attributes

- *Agriculture economy linkage*
- *Trading Towns*
- *Manufacturing Towns*
- *Informal Economies*
- *Mono-economic*
- *National and Global Linkages*

Human Development Attributes

- *High-HDI_Low-GII*
- *Low-HDI_Low-GII*
- *Low-HDI_Low-FSI*
- ....

Environmental Attributes

- *Water-stressed/Water-rich*
- *Forest/Mineral Resource-rich*
- *Natural Disaster Risk*

Annexure 3: Checklist for data collected from the 12 ULBs

S. No.	Head	Details	Bidar CMC	Yadgir CMC	Lingasugur TMC	CR Nagar TMC	K.R.Nagar TMC	Ullal CMC	Sakleshpur TMC	Bangarpet TMC	Davanagere MC	Sira CMC	Hubli - Dharwad MC	Haliyal TMC
1	**Governance Structure**													
1.1	Jurisdiction maps	ULB ward and zonal maps	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
1.2	Human Resources in ULB	Organisation structure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Sanctioned strength/present strength	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Capacity building programmes including municipal cadre and internships									Yes	Yes	Yes	
1.3	Role of ULB	Assigned role/actual role as per org. structure									Yes	Yes	Yes	Yes
		Public grievances registry (last 2-3 years)				Yes	Yes				Yes	Yes	Yes	Yes
2	**Municipal Finance and Economic Outlook of City Region**													

2.1	Municip al Budget	Audited financial statements (balance sheets for last five years)	Yes	Yes	Yes	Yes	Yes	2 Years	Yes	Yes	Yes	Yes	Yes	Yes
		Detailed revenue and expenditure statements		Yes	Yes	Yes	Yes	2016-17	Yes	Yes	Yes	Yes	Yes	Yes
		Municipal asset register including land maps and buildings inventory	Yes					Yes			Yes	Only Municip al Asset register available	Yes	
2.2	Planned Investm e nts	ULB/government planned projects DPRs/project reports						SW M DPR			Yes			
		Cash flow statements for planned projects including O&M									Yes			
		Private development and building plan approval application registry (large projects only)									Yes	Yes		Yes

		Special projects planned (SEZs, Tourism, economic/ transport corridors, industrial clusters) information									Yes			Yes
2.3	Jobs and Employ m ent	Reports on local employment patterns and trends (if available with ULB)									No	No		
3	**Planning and Infrastructure**													
3.1	City Level Plans	Master Plan (if available)	Yes	Yes		Yes	Yes			Yes	Yes	Yes, being revise d by SDA	Yes	Yes
		Comprehensive Development Plan									Yes	ODP available	Yes	
		City Sanitation Plan									Yes	DPR prepared and submitte d to DMA		
		Slum maps						List	List		Yes	Yes		
		Slum-free/Housing for All Plan of Action									Yes	Yes		
		Solid Waste Management plans	Yes				Yes	SW M DPR		Yes	Yes	DPR prepare d	Yes	Yes

												and submitted to DMA		
3.2	Existing Infrastruc ture	Water supply capacity and network map (if managed by ULB)									Yes	Available with Engineer	Yes	Yes
		Sewerage treatment capacity and network map (if managed by ULB)				Yes	Yes			Yes	Yes	Yes	Yes	Yes
		Road network map under ULB						Yes	Yes		Yes	ODP and Masterpla n	Yes	Yes
		Open spaces and parks under ULB				Yes			Yes	Yes	Yes	Masterpla n	Yes	Yes
		Property registry (ward-wise totals by land use category)	Yes						Yes		Yes			Yes
4	**Human Development**													
4.1	Healthca r e and Educatio n Facilities	Schools and colleges under ULB								Yes		Yes		

		Any other community level facilities and amenities under ULB												
4.2	Migration	Reports on migration to/from the city (if available with ULB)								No	No			
5	**Environment and Sustainability**													
5.1	Water Scenario	Surface water bodies map (unless already included in Master Plan/CDP)				Yes	Yes				Yes	Yes	Yes	Yes
		Bore well registry (if available)					Yes			Yes				Yes
5.2	Disaster Management	Disaster management plan (if available)												
5.3	Local Environment	Reports on status of local environment (if available with ULB)												

Note: Yes means data available

Table 28: Checklist for data collected from the 12 ULBs

Annexure 4: Computation of Human Development Index (DHDR's Government of Karnataka)

The indicators taken into consideration for the computation of Human Development Index (HDI) are:
Living standard

1. % of HH having access to cooking fuel
2. % of HH having access to toilet
3. % of HH having access to water
4. % of HH having access to electricity
5. % of HH having pucca houses
6. % of Non-Agricultural Works (Main + Marginal)
7. Per Capita Income

Health

1. Child Mortality Rate (CMR)
2. Maternal Mortality Rate (MMR)

Education

1. Literacy Rate
2. Gross Enrolment Rate in Schools (Primary + Upper Primary + Secondary)

The indicators taken into consideration for the computation of Child Development Index (CDI) are as follows:

1. Health - Child Mortality Rate 0-5 years
2. Nutrition
    a) % of malnourished children
    b) % of children born under weight
3. Education - % of dropout children main streamed (from primary and secondary school)

The indicators taken into consideration for the computation of Food Security Index (FSI) are as follows:

1. Cropping index
2. Percentage change in NSA
3. Per capita food grain production
4. Percentage of forest cover to total geographical area
5. Irrigation intensity
6. Percentage of area degraded (cultivable waste) to total geographical area
7. Percentage of leguminous area (area under pulses)
8. Percentage of BPL Card Holders
9. Per Capita Income
10. Percentage of non agricultural workers
11. Average size of holdings
12. Percentage of agricultural labourers to total workers
13. Percentage of villages having Public Distribution System(PDS) outlets within the village
14. Child Mortality Rate (CMR)
15. Percentage of HHs having access to water
16. Share of pregnant women with anaemia – ANE
17. Percentage of malnourished children
18. Percentage of children born under weight
19. Female literacy rate

Annexure 5: Computation of Climate-based Index (CI) for drought vulnerability assessment at taluk level.

Climate based indices derived from the following seven sub-components is used to classify the taluks under 5 drought vulnerability classes (KSNDMC, 2017).

Sr. No	Code	Indicator
P1	SWM-CV	South West Monsoon-Coefficient of Variation
P2	NEM-CV	North East Monsoon-Coefficient of Variation
P3	PMARD	Pre-Monsoon Average Rainy Days
P4	SWARD	South West Monsoon Average Rainy Days
P5	NEARD	North East Monsoon Average Rainy Days
P6	ANNARD	Annual Average Rainy Days
P7	AIA	Percent Aridity Index Anomaly

Table 29: Indicators for Climate-based Index

As per the above indicators the data was analysed for each of the Taluks over a period of 55 years and used for calculation of climate based Index (CI). Taluk wise historical rainfall data of Karnataka State for 55 years (1960 to 2014) was considered for the study. Average rainfall over the 55 years' period is considered as Normal rainfall.

Among these seven sub-components, South West Monsoon coefficient of variation (SWM-CV), North East Monsoon coefficient of variation (NEM-CV) and AIA have positive functional relationship and their effect is directly proportional to the values of Climate-based Index(CI) while the other four sub components such as PMARD, SWARD, NEARD, ANNARD have negative functional relationship with the CI.
The average contribution of different sub-components (P1-P7) towards CI (176 Taluks) ranged from 12 to 18%. The sub-components SWM-CV (P1) and NEM-CV (P2) contributed least while NEARD (P5) & PMARD (P3) contributed highest to the CI-index.

The contribution of the seven sub-components to the CI index was in the following order: NEARD (P5)> PMARD (P3)> AIA (P7) > ANNARD (P6) >SWARD (P 4) > NEM -CV (P2.)>SWM-CV (P1).Based on CI values, the taluks were classified into 5 classes namely, very slightly vulnerable, slightly vulnerable, moderately vulnerable, highly vulnerable, very highly vulnerable.

Annexure 6: Images

Figure 32: Interaction with ULB officials at Haliyal TMC

Figure 33: Basic facilities in an informal settlement in Haliyal TMC

Figure 34: Solid Waste Processing Facility in Haliyal TMC

Figure 35: Solid Waste Processing Facility in Haliyal TMC

Figure 36: Discussionw with Smart City Officials from Hubli-Dharwad

Figure 37: KR Nagar – Meeting with Ex-Corporato

Figure 38: KR Nagar Solid Waste Processing Facility

Figure 39: KR Nagar Solid Waste Processing Facility

Figure 40: KR Nagar Re-developed Slum


Figure 41: Reconstructed Housing on the Ullal Coast

Figure 42: Sakleshpur main market place

Figure 43: C.R. Nagar Sewage Treatment Plant

Figure 44: Interview with the Chairman of Bangarpet TMC

Figure 45: Bangarpet Waste Management Plant

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