City Selection

Methodology -Effect Document

Project

Strengthening the Operation & Maintenance Sector for Servicing Decentralised Urban Sanitation Infrastructure in Karnataka, India

BORDA

Consortium for DEWATS Dissemination Society

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List of Abbreviations

ADB	Asian Development Bank
AEE	Assistant Executive Engineer
ASCI	Administrative Staff College of India
BWSSB	Bangalore Water Supply and Sewerage Board
BCC	Belgaum City Corporation
BSUP	Basic Service to the Urban Poor
BBMP	Bangalore Bruhat Mahanagara Palike
CAGR	Compound Annual Growth Rate
CAA	Constitution Amendment Act
CPHEEO	Central Public Health and Environmental Engineering Organisation
CDP	City Development Act
CDD	Consortium for DEWATS Dissemination
DMA	Directorate of Municipal Administration
DSI	Decentralised Sanitation Infrastructure
DPR	Detailed Project Report
GBWASP	Greater Bangalore Water and Sanitation Project
GoK	Government of Karnataka
GoI	Government of India
HUDA	Hassan Urban Development Authority
iDECK	Infrastructure Development Corporation (Karnataka) Limited
INR	Indian Rupees
IHSDP	Integrated Housing and Slum Development Programme
JE	Junior Engineer
JnNURM	Jawaharlal Nehru Urban Renewal Mission
JICA	Japan International Corporation Agency
KUDCEMP	Karnataka Urban Development and Coastal Environmental Management Project
KUWASIP	Karnataka Urban Water Supply Improvement Project
KMRP	Karnataka Municipal Reforms Project
KUIDP	Karnataka Urban Infrastructure Development Project
MSEZ	Mangalore Special Economic Zone
MSW	Municipal Solid Waste
MMC	Mangalore Municipal Corporation
MLD	Million Liters Per Day
MLA	Member of Legislative Agency
NUSP	National Urban Sanitation Policy
NKUSIP	North Karnataka Urban Sector Investment Program
O&M	Operations and Maintenance
STP	Sewage Treatment Plant
UASBR	Up-flow Anaerobic Sludge Blanket
ULB	Urban Local Body
UGD	Underground Drainage
WB	World Bank
WTP	Water Treatment Plant

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Introduction to the Project

Even as the sanitation infrastructure coverage in India is gradually improving, it has essentially focused on centralised[1] approaches. Dependence on the centralised approach alone lacks the comprehensiveness and flexibility needed to address the broader dimensions and dynamics of the sanitation challenges. The limitations of the centralised approach are widely acknowledged and there is an agreement among most experts for the need to complement the centralised approach with decentralised[2] approach. For example, the NUSP clearly states that any future sanitation effort must consider not only centralised systems, but a range of decentralised technical options complimented with socio-economic considerations. Decentralised passive systems are less resource intensive, more adaptable to local conditions and regarded as better able to meet sustainability criteria. Its modular character is proven to be an effective solution when facing rapid urban growth.

Although as compared to electro-mechanical based system, simpler passive decentralised systems require much less O&M, still a large number of decentralised systems fail to deliver their performance potential due to lack of professional O&M service. There is no regulatory framework and functioning institutional mechanism for management of decentralised system. At present, the O&M services are provided by the informal sector with a 'fail and fix' approach. The currently widely in use infrastructure like septic tank is also operated and managed in a very unscientific and inefficient manner.

In the context of adoption/endorsement of decentralised solutions by government, the O&M requirements of DSI at city-scale pose a big challenge to the city government. Instead of having to manage a few highly sophisticated units, now, they will be required to manage large numbers of relatively less complicated decentralised systems. For a city to be successful in managing these systems, the city needs to work on governance structure, service delivery mechanism, engagement of private sector and end users.

Therefore, the specific need that this project aims to address is to strengthen the enabling environment (both in terms of governance and market) to provide professional O&M services for urban sanitation infrastructure, especially for decentralised and onsite wastewater treatment systems. More specifically, the project aims to address the following problems: (1) There is no clear policy for O&M for decentralised urban sanitation infrastructure at city level, although advisory notes have been issued by the government like the advisory note on Improving Urban Water Supply and Sanitation Services in India, advisory note on Septage Management in Urban India, etc. (2) The vast majority of decentralised urban sanitation infrastructure do not perform as they should, because they are operated and maintained in an inefficient manner (3) Lack of knowledge on O&M requirements of DSI at all levels – governance to end – user.

[1]Centralised systems are those facilities which treats wastewater from off-site
[2]Decentralised systems are the on-site treatment systems which looks at treating wastewater at the source of generation and can be managed individually

One of the key project objectives is to support city governments to implement O&M related recommendations of relevant policies and advisory notes such as the septage management advisory note for decentralised sanitation infrastructure and in order to do so the O&M sector for the DSI in a city should be strengthened which can be taken as a benchmark for other city governments; consequently the city selection for implementation of this project becomes the preliminary and essential step in the process of laying foundation of the project. The detailed methodology for selection of city is explained in this document.

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1. INTRODUCTION

1.1. Urbanization in Karnataka

Karnataka is the ninth largest state by population with 61,130,704 inhabitants spread across 219 ULBs. The population density is 277 people per km^2, with 34% living in urban areas. It is the eighth largest Indian state by area. The state covers 5.8% of the total geographical area of India.[3]

Bangalore, Mysore and Mangalore account for over 40% of the state's urban population. Decadal population growth for the whole state was recorded at 15% and the urban population recorded an exponential growth of about 32%. Many cities are emerging as an alternative destination to Bangalore in service as well as tourism sectors like Mysore, Mangalore, etc.

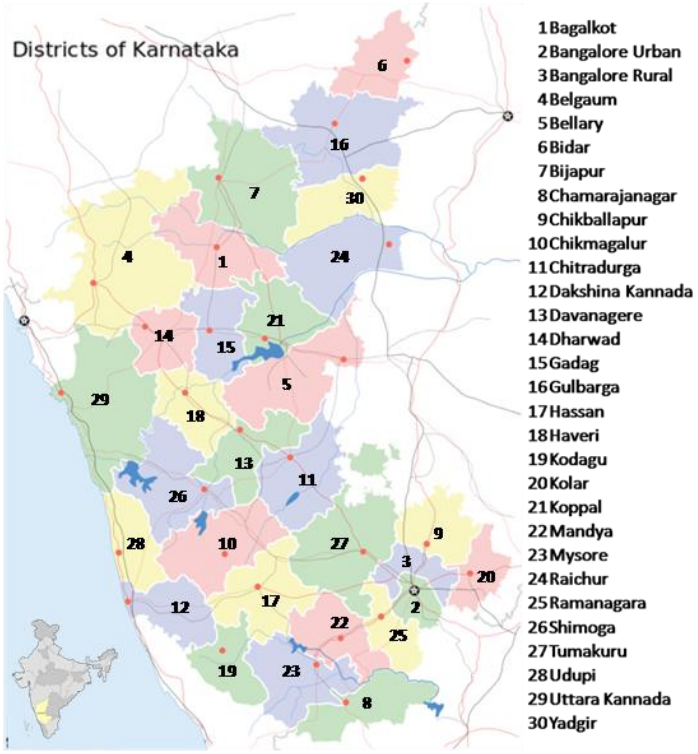

Figure 1: Districts in Karnataka

1.2. Sanitation scenario

The 74th CAA came into force in June, 1993 which sought to improve, strengthen urban governance and management of services including sewage management. Every ULB, thus, has to provide the public with sewage management system, be it a well connected UGD network leading to a STP or facilities for O&M of DSI. Of the 219 ULBs in the state, 184 ULBs do not have a sewage treatment plant as on date. 35 ULBs have installed STPs, while consent has been given to another 30 ULBs. Thus, these 30 ULBs dispose untreated sewage into water bodies through a partially connected UGD network. Even in the cities with installed STPs, not all areas are connected. Thus, it is a common phenomenon in almost all the ULBs to have manifold on-site sanitation infrastructure mainly in the form of leach pits and septic tanks with/without soak pits.

One of the most important reasons for the appalling sanitation scenario in Karnataka is a definitive lack of urban landscape planning, considering the growth parameters and development pace. Insufficient administration and management capacities, along with lack of up-gradation of infrastructure/public services through new and innovative

[3] Figure 1 – Source: CC-by-sa PlaneMad/Wikimedia; Link - http://en.wikipedia.org/wiki/Karnataka#mediaviewer/File:Karnataka_locator_map.svg

approaches/technology, have been identified as one of the key issues. Limited manpower in administration and implementation teams is making it difficult for the cities to implement, supervise and monitor the services.

There is a greater challenge in terms of lack of attitude and behavior towards need for proper hygiene and sanitation. The state of community and public toilets indicates an urgent need for better maintenance, behavioral change and hygiene education at grassroot levels.

1.3. Investments in sanitation

CPHEEO estimates private investment potential of USD 36,021 million by 2021 for safe water supply and sanitation services in the state. . A list of ongoing and implemented projects in the state in order to address the sanitation scenario has been provided below:

Externally aided projects

- ADB assisted KUDCEMP - optimize social and economic development in the urban areas of west Karnataka by supporting investments in urban infrastructure and services required to meet basic human needs and facilitating policy reforms to strengthen urban management.
- WB assisted KUWASIP - demonstrate feasibility of continuous pressured (24x7) water supply in selected demonstration zones of 3 project cities (viz., Belgaum, Gulbarga &Hubli-Dharwar)
- ADB assisted NKUSIP - support improvements in sanitation, water supply and municipal infrastructure in the following 14 ULBs: Basavakalyan, Badami, Bellary, Bidar, Gadag-Betegeri, Gokak, Haveri, Hospet, Ilkal, Nippani, Raichur, Shahabad, Sindhanur and Yadgir.
- WB assisted KMRP - help improve the delivery of urban services through enhancing the quality of urban infrastructure, and strengthening the institutional and financial frameworks for urban services at the ULB and state levels.

Other Projects

- Centrally sponsored Mega City Scheme- primary objective of the scheme is to undertake infrastructure development projects of city-wide/regional significance covering a wide range of components like water supply and sewerage, roads and bridges, city transport, solid waste management etc.

Government Sponsored Projects

- Urban Infrastructure and Governance (UIG) and the Basic Services to the Urban Poor (BSUP) under JnNURM - main thrust is on infrastructure projects relating to water supply and sanitation, sewerage, solid waste management, road network, urban transport and redevelopment of old city areas with a view to upgrading infrastructure therein, shifting industrial and commercial establishments to conforming areas, etc.
- Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT) - aims at improvement in urban infrastructure in towns and cities in a planned manner. It shall subsume the existing schemes of Integrated Development of Small and Medium Towns (IDSMT) and Accelerated Urban Water Supply Programme (AUWSP).
- IHSDP - an integrated approach in ameliorating the conditions of the urban slum dwellers who do not possess adequate shelter and reside in dilapidated conditions.

2. City Selection

Decentralised Sanitation Infrastructure (DSI) lacks efficiency due to insufficient and unscientific O&M activities. It is necessary to bridge the gap between various sectoral stakeholders and to develop standardization in the process. From the project point of view, corresponding to one of the milestones "Eight more cities have proposed or expressed interest to adopt/replicate portions of the new approaches towards O&M policy and its enforcements" it becomes imperative that the selection of city for project implementation is carried out through rigorous selection criteria along with qualitative and quantitative analysis so that the selected city is a representative of all other cities in order to increase the scalability and replicability factor of the project. Hence, the selected city must not only be representative of 219 ULBs of the state, but also be futuristic in terms of operations & maintenance and develop its internal capacity accordingly.

Selection criterion is thus developed as a filter to select the city. These criteria corresponding to the project objectives and key milestones are derived from the analysis of sanitation scenarios in Karnataka and considering the various influencing parameters, are applied at different stages of selection to short-list suitable cities for the project.

Three stages of selection have been undertaken, with appropriate selection criteria and methodology for each stage, effecting into the requisite output at each stage.

Figure 2 describes the methodology of city selection.

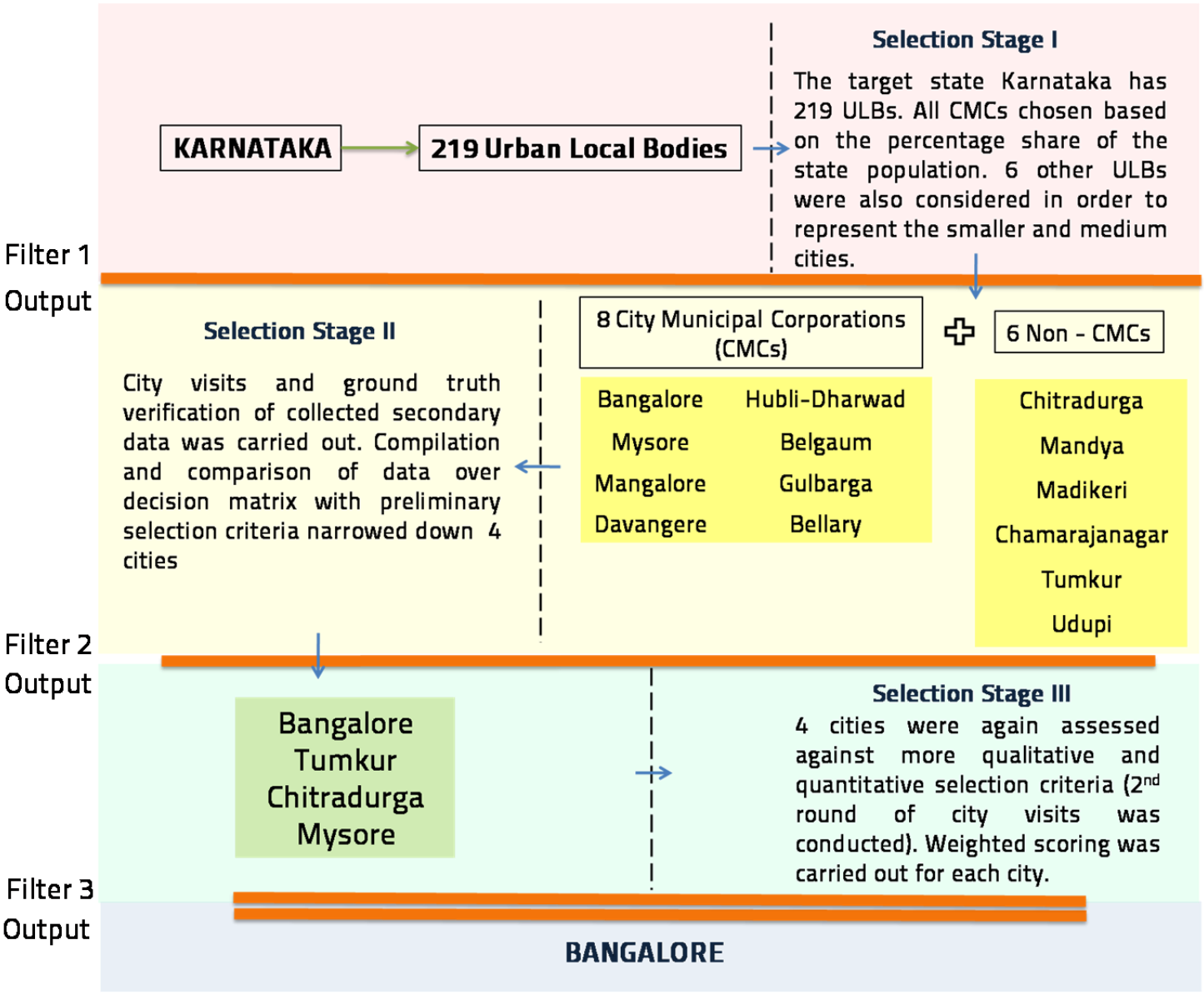

Figure 2: Flowchart – selection procedure of city selection

2.1. Selection Stage I - Methodology

Karnataka has 219 ULBs, which have been classified into categories based on the population, as listed below:

1. 8 City Corporations including BBMP,
2. 44 City Municipal Councils,
3. 94 Town Municipal Councils ,
4. 68 Town Panchayat and
5. 5 Notified Area Committees based on the population

In this stage, with the understanding that cities with higher population translates into wider presence of decentralised/on-site sanitation infrastructure and correspondingly meant there would be higher problems of O&M of DSI, translating into higher demand for improvised O&M products and services.

2.2. Selection Stage I - Effect

All the 8 city corporations were selected, thus eliminating the rest 211 ULBs. However, in order to not be overly judgmental about the smaller populated cities, six[4] non city municipal corporation cities were additionally considered. This also strengthened the representativeness of the cities in Karnataka.

Accordingly, the preliminary selection of cities includes:

City Corporations

1. Bangalore	2. Hubli– Dharwad
3. Mysore	4. Belgaum
5. Mangalore	6. Gulbarga
7. Davanagere	8. Bellary

Other cities

9. Tumkur	10. Chitradurga
11. Mandya	12. Madikeri
13. Chamarajanagar	14. Udupi

2.3. Selection Stage II - Methodology

All the preliminary selected cities are assessed against a defined set of selection parameters as mentioned below:

[4] 6 Non-CMC cities were selected based on their viscinity to the project office location.

- *Direct influencing parameters* – This includes aspects pertaining to existing sanitation infrastructure, institutional capacities, etc. which directly influence the selection target city

    1. Population of the city
    2. Coverage of on-site sanitation (DSI Coverage)
    3. Availability of local O&M service providers
    4. Municipality's revenue and capital income with % of annual budget dedicated to sanitation related activities
    5. Capacity of the ULB to collaborate with the project
    6. Previous experience of implementing DSI approaches
    7. The city has CSP,CDP and SLB in place

- *Indirect influencing parameters* – This includes factors such as favorable working relations with the ULBs, existence and role of local NGOs at grassroot level, etc
    1. Distance from Bangalore
    2. Familiarity with the region (e.g. in terms of CDD Society's relationship with the administration, previous projects, presence of CDD Society's partner, etc.)
    3. Working relationship between ULB and the local O&M service providers
    4. Availability of relevant stakeholders (policy makers, elected representatives, donors, R&D, grass-root NGOs)

a. Criteria for scoring of cities

A preliminary round of city visits was carried out by the project team with respect to the above mentioned parameters; from the city visits, the data collected was compiled into a standardized format and a linear scoring of the cities with respect to each criterion was carried out. The linear scoring was set as green being best suited (10 marks), yellow being moderately suited (5 marks), red being poorly suited (0 marks) and blue being data not available (ignored in the scoring). The marks corresponding to each range[5] indicated by specific color code is shown in table 1.

10 Marks	5 Marks	0 Marks	N/A

Parameters		Best Suited	Moderately Suited	Poorly Suited	Remarks
Market Size	Population (no. of HHs)	>1,00,000	25,000 – 1,00,000	<25,000	The population of a city gives the potential market size that is need of proper sanitation services. More the population greater will be the demand for the service
	Population Density	>10,000	4,000 - 10,000	<4,000	
DSI Infrastructure	UGD Coverage (no. of HH covered)	<25,000	25,000 - 1,00,000	>1,00,000	More the UGD coverage the less is the viability of the project.
Socio-economic Status	Per capita income (INR/Individual): 2006-07	>20,000	10,000 - 20,000	<10,000	More revenue predicts that there is a market for the service and citizens of that city can afford the service
Viability	Cooperation from ULB	Very Helpful	Helpful	Un-cooperative	Subjective Scoring
Data Availability (CSP)		Yes	In Progress	No	Bulk data regarding sanitation of the city can be obtained from the document
Score Allotted		10	5	0	

Table 1: Scoring Details for the Decision Matrix

[5] The range was set based on the data collected from the preliminary site visits and secondary source

2.4. Selection Stage II - Effect

Based on the derived scores, top four ranked cities have been selected. These cities are:

1. Bangalore
2. Tumkur
3. Mysore
4. Chitradurga

City	Market Size		DSI Infrastructure	Socio-economic Status	Viability				
	Population (no. of HHs)	Population Density	UGD Coverage (no. of HH covered)	Per capita income (INR/Individual): 2006-07	Cooperation from ULB	Data Availability (CSP)	Overall Scoring	Relative Scoring	Ranking
Bangalore	1920000	12985	864000	59277	Very Helpful	No	40	6.7	3
Hubli - Dharwad	188000	4715	156040	26424	Un-cooperative	No	20	3.3	7
Mysore	184000	23373	170016	24383	Very helpful	Yes	50	8.3	1
Belgaum	98009	5191	43538	19858	Helpful	Yes	35	5.8	4
Mangalore	107800	4712	59290	41830	Helpful	No	30	5.0	5
Gulbarga	220398	8313	182930	17624	Helpful	Yes	35	5.8	4
Davangere	87026	6042	39162	20374	Un-cooperative	No	25	4.2	6
Bellary	81929	4766	49158	34715	Helpful	Yes	35	5.8	4
Tumkur	61000	6293	24400	17038	Very helpful	Yes	45	7.5	2
Chitradurga	28000	6749	15680	17728	Very helpful	In Progress	40	6.7	3
Mandya	26000	8102	20800	16460	Very Helpful	No	35	5.8	4
Udupi	25000	1837	6500	26558	Very Helpful	No	35	5.8	4
Chamaraj Nagar	14000	3727	N/A	14117	Helpful	No	10	2.0	8
Madikere	6000	1955	6000	3535	Very Helpful	No	20	3.3	7

10 Marks | 5 Marks | 0 Marks | N/A

*Note: N/A is not considered in the average scoring calculations

Table 2: City Score Sheet

2.5. Selection Stage III - Methodology

Following the short-listing of 4 cities, more comprehensive selection criteria were developed considering both the technical as well as other influencing parameter perspectives as follows:

(i) *Replicability*

Atleast 70 % of the urban cities in Karnataka should be able to replicate the selected city's intervention, fully or partially. This criterion is necessary for meaningful dissemination of project learning's to other cities of Karnataka mainly with regards to the third objective of the project: Dissemination of knowledge of new approaches to O&M of DSI to non-targeted cities.

(ii) *Scalability*

The O&M service sector in the selected city should be large enough to enable the creation of a marketplace, after the development of appropriate technical and managerial service packages[6], as well as the O&M policy.

(iii) *Enabling Environment*

The selected city should have pro-active city government, NGOs and other civic actions providing a crucial stakeholder engagement for sustainable and better environment. Such an ecosystem can play an important role in the success of the project.

(iv) *Viability*

A project is viable if the outcome of the project is prudent and profitable comparing cost, time, quality, and manpower associated with it.

A round of city visits were made to the five shortlisted cities to get an understanding of the above factors, meet the local people, understand the problems they are facing regarding the O&M of their sanitation infrastructure, perspectives of local NGOs and meet locally influencing people (like mayor, MLAs, etc.).

a. Criteria and Weighted Scoring

The criteria for selection of project city and its impact in terms of weighted score for assessing the demand of O&M services with respect to the key project milestones have been described as follows.

[6] Service Package stands for a group of O&M activities that the user of the DSI would demand as one product/service.

Sl. No.	Criteria	Weighted score	Sum of weighted scores
1	**Existence and Quantity of different types of DSI**		
	User Interface		6
	Public Toilets/Community Toilets	1.5	
	Collection		
	Septic Tanks/Soak Pits	1.5	
	Conveyance		
	Cesspool vehicles	0.3	
	Simplified Sewer Systems - Gravity and Vacuum	0.2	
	Treatment		
	Decentralised/On-site treatment systems (other than septic tanks and pits)	2.5	
2	**Untapped Market (Total HHs - septic tanks HHs - UGD HHs)**	0.5	0.5
3	**Willingness of city to participate in the project**	1.7	1.7
4	**Connectivity to other cities**		
	Physical Connectivity	1.2	1.2
5	**Other ongoing projects relevant to O&M project in the city**	0.6	0.6
	Total	10	10

Table 3: Overview of weighted scoring

The methodology for assigning weighted score to each city based on the criteria mentioned in table 3 is described below.

- **Criteria 1. Existence and quantity of different types of DSI in the city**

This criterion is based on the following key project milestones:

Milestone-1: Less the options, landscape study becomes less relevant
Milestone-2: There cannot be business without good base for demand
Milestone-3: O&M Packages requires presence of different variety of systems
Milestone-6: 1000 Users demands services
Milestone-7: Five Service providers
Milestone-8: 500 users avails the service

**Note: The milestone numbering is done with respect to the results framework from the project proposal which is given in annexure II*

This is one of the most important criteria as it stresses on the various components of sanitation value chain and O&M servicing of its sub-components. The presence of different categories and sub-categories of DSI is therefore an indicator of the multitude of problems faced likely because of lack of O&M services in the region. Presence of private sector players servicing DSI in the region is also an indication of

high O&M demand; and hence carries the maximum weight-age (60% of the total score).

This criterion was further divided into the 4 core pillars of sanitation value chain: User Interface, Collection, Conveyance and Treatment System. User Interface (Public toilets/Community toilets) and Collection (Septic tanks/Soak pits) are given 50% of the total weighted score of the main criteria i.e. max. 1.5 each out of 6. Scoring was based on the extent of O&M service requirements for this specific pillar, replication of the particular O&M services in other cities and from the scalability perspective. The scoring of each sub-criterion under UI and Collection was further divided into equal interval corresponding to the range of quantity of that particular sub-criterion. The checklist for scoring is shown in Table4.

Similarly, the conveyance part was also sub-divided into two major components – cesspool vehicles and simplified sewer systems (gravity/vacuum). This topic was given 8% of the total weighted score (max. 0.5 out of 6). Out of this scoring, 60% of the marks were given to cesspool vehicles since the enabling environment for the cesspool vehicles as compared to that of simplified sewer systems in other cities of Karnataka.

Lastly, sub-criterion: Treatment at decentralised/On-site level is given the highest weight age (max. 2.5 out of 6) since this is crucial piece in the value chain, involves technical, investment, stakeholder engagement and addresses Replicability, Visibility, Scalability and viability aspects of the project.

User Interface		Collection		Conveyance				Decentralised treatment systems	
Public/Community Toilets		Septic Tanks/Soak Pits		Cesspool Vehicles			Simplified Sewer Systems		
Quantity	Score	Quantity	Score	Quantity	Score		Quantity	Score	Quantity	Score
0-5	0.0	0-5000	0.0	0-5	0.00		0-5	0.00	0-10	0.0
6-20	0.3	5001-10000	0.3	6-10	0.06		6-15	0.04	11-20	0.5
21-50	0.6	10001-15000	0.6	11-15	0.12		16-30	0.08	21-30	1.0
51-75	0.9	15001-20000	0.9	16-20	0.18		31-50	0.12	31-40	1.5
76-150	1.2	20001-25000	1.2	21-25	0.24		51-75	0.16	41-50	2.0
>150	1.5	>25000	1.5	>25	0.30		>75	0.20	>50	2.5

Table 4: Checklist for the selection criteria for DSI[7]

- **Criteria 2. Untapped Market**

From the milestones' view-point, this criterion is based on the following key milestone2: "There cannot be business without good base for demand"

[7] The range of quantity for each of the components of sanitation value chain is taken corresponding to the data collected from the city visits and secondary sources like CSPs.

This criterion has been allotted 5% of the total weighted score (i.e. max 0.5 out of 10) in accordance to the extent of its influence. The checklist[8] for this criterion is shown in Table6.

Quantity (no. of HHs)	Score
0-500	0.0
501-1000	0.1
1001-3000	0.2
3001-7000	0.3
7001-12000	0.4
>12000	0.5

Table 5: Checklist for Untapped Market

This criterion specifically focuses on the households within a city, presently not covered either by UGD nor served by septic tanks/soak pits. The assumption is that this un-served population could be the potential markets for the O&M sector in the near future.

Sl. No.	Criteria	Bangalore	Chitradurga	Tumkur	Mysore
1	Total HHs	6670000	28000	61000	184000
2	HHs having Septic Tanks	470000	10920	25240	16206
3	UGD Coverage - no. of HHs	4320000	15680	24400	167440
4	**Untapped Market - no. of HHs**	**1880000**	**1400**	**11360**	**354**

Table 6: O&M market potential in each city

- **Criteria 3. Willingness of the city to participate in the project**

This criterion is based on milestone 4: "The targeted city has adopted and implemented a new policy for O&M of decentralised urban sanitation infrastructure".
This criterion is a subjective one as it depends on the response of city government and the local residents to the project approach. Whether the city is in need of quality O&M services of DSI, and whether this need is realized by the city officials and local residents plays an important criteria in the selection of the project city.

This criterion is the first step and paramount in the successful implementation of this project and has been allotted 17% of the total marks (i.e. max 1.7 out of 10). This qualitative assessment has been done at five levels: poor, fair, good, very good and excellent.

[8] The range of quantity of HHs is taken corresponding to the data collected from the city visits

Willingness to participate	
Scale	Score
Poor	0.00
Fair	0.43
Good	0.85
Very good	1.28
Excellent	1.70

Table 7: Qualitative Assessment scoring of Willingness to Participate

- **Criteria 4. Connectivity to other cities**

Based on the key milestone 9: "8 more cities have proposed or expressed interest to adopt/replicate portions of the new approaches towards O&M policy and its enforcements", this criterion helps to look at whether the city is well connected to other cities physically and administratively.

The scoring of this criterion is done on a subjective basis with 12% of the total weighted score (max 1.2 out of 10). The qualitative scoring checklist for this criterion is shown in Tab 8.

Physical Connectivity	
Quantity	Score
Poor	0.0
Fair	0.3
Good	0.6
Very good	0.9
Excellent	1.2

Table 8: Qualitative Assessment scoring of connectivity to other cities

- **Presence of other funding agencies in the city**[9]

With a project of this intention, it's better to collaborate with other similar projects by other funding agencies such as ADB, WB, GoK, GoI, JICA, etc. in the selected city. This gives a leveraging effect to the scale-up demonstration and policy advocacy efforts of the project. This criterion has been allotted 6% of the total weighted score (i.e. max 0.6 out of 10).

The scoring criterion is based on the number of other funding agencies in the city, and the scoring checklist is shown in Tab 9.

No. of funding agencies	Score
0	0.00
1	0.12
2	0.24
3	0.36
4	0.48
5	0.60

Table 9: Checklist for other funding agencies

b. Scorecards of short-listed cities

Each of the 4 cities was scored on the basis of data collected from the second round of city visits. The consolidated data of each city was scored accordingly to compare it to the other cities. The tables below show the scoring details of each of the four shortlisted cities.

[9] The volume of funding by each of the funding agencies is not taken into consideration

Sl. No.	Criteria	Quantity	Weighted score	Total Score	Summation of total score
1	**Existence and Quantity of different types of DSI**				
	User Interface				6
	Public Toilets/Community Toilets	652	1.5	1.5	
	Collection				
	Septic Tanks/Soak Pits	470000	1.5	1.5	
	Conveyance				
	Cesspool vehicles	300	0.3	0.3	
	Simplified Sewer Systems - Gravity and Vacuum	75	0.2	0.2	
	Treatment				
	Decentralised/On-site treatment systems (other than septic tanks and pits) - minimum	50	2.5	2.5	
2	**Untapped Market (Total HHs - septic tanks HHs - UGD HHs)**	1880000	0.5	0.5	0.5
3	**Willingness of city to participate in the project**	Excellent	1.7	1.7	1.7
4	**Connectivity to other cities**				
	Physical Connectivity	Excellent	1.2	1.2	1.2
5	**Presence of other funding agencies in the city**	4	0.6	0.48	0.48
			TOTAL SCORE		**9.9**

Table 10: Criteria and weighted scoring – BANGALORE

Sl. No.	Criteria	Quantity	Weighted score	Total Score	Summation of total score
1	**Existence and Quantity of different types of DSI**				
	User Interface				1.84
	Public Toilets/Community Toilets	15	1.5	0.3	
	Collection				
	Septic Tanks/Soak Pits	25240	1.5	1.5	
	Conveyance				
	Cesspool vehicles	4	0.3	0	
	Simplified Sewer Systems - Gravity and Vacuum	10.5	0.2	0.04	
	Treatment				
	Decentralised/On-site treatment systems (other than septic tanks and pits) - minimum	7	2.5	0	
2	**Untapped Market (Total HHs - septic tanks HHs - UGD HHs)**	11360	0.5	0.4	0.4
3	**Willingness of city to participate in the project**	Excellent	1.7	1.7	1.7
4	**Connectivity to other cities**				
	Physical Connectivity	Excellent	1.2	1.2	1.2
5	**Presence of other funding agencies in the city**	3	0.6	0.36	0.36
			TOTAL SCORE		**5.5**

Table 11: Criteria and weighted scoring – TUMKUR

Sl. No.	Criteria	Quantity	Weighted score	Total Score	Summation of total score
1	**Existence and Quantity of different types of DSI**				
	User Interface				0.9
	Public Toilets/Community Toilets	8	1.5	0.3	
	Collection				
	Septic Tanks/Soak Pits	10920	1.5	0.6	
	Conveyance				
	Cesspool vehicles	0	0.3	0	
	Simplified Sewer Systems - Gravity and Vacuum	0	0.2	0	
	Treatment				
	Decentralised/On-site treatment systems (other than septic tanks and pits)	0	2.5	0	
2	**Untapped Market (Total HHs - septic tanks HHs - UGD HHs)**	1400	0.5	0.2	0.2
3	**Willingness of city to participate in the project**	Good	1.7	0.85	0.85
4	**Connectivity to other cities**				
	Physical Connectivity	Good	1.2	0.6	0.6
5	**Presence of other funding agencies in the city**	3	0.6	0.36	0.36
				TOTAL SCORE	**2.9**

Table 12: Criteria and weighted scoring – CHITRADURGA

Sl. No.	Criteria	Quantity	Weighted score	Total Score	Summation of total score
1	**Existence and Quantity of different types of DSI**				
	User Interface				2.44
	Public Toilets/Community Toilets	556	1.5	1.5	
	Collection				
	Septic Tanks/Soak Pits	16206	1.5	0.9	
	Conveyance				
	Cesspool vehicles	2	0.3	0	
	Simplified Sewer Systems - Gravity and Vacuum	6	0.2	0.04	
	Treatment				
	Decentralised/On-site treatment systems (other than septic tanks and pits)	4	2.5	0	
2	**Untapped Market (Total HHs - septic tanks HHs - UGD HHs)**	354	0.5	0	0
3	**Willingness of city to participate in the project**	Very Good	1.7	1.275	1.275
4	**Connectivity to other cities**				
	Physical Connectivity	Very Good	1.2	0.9	0.9
5	**Presence of other funding agencies in the city**	5	0.6	0.6	0.6
				TOTAL SCORE	**5.2**

Table 13:Criteria and weighted scoring – MYSORE

2.6. Selection Stage III - Effect

From the scorecards of all cities, it is very clear that there is a distinct gap between Bangalore and other cities. As the different stages of selection criteria un-wrapped, it skewed towards the notion that cities with large problems are the cities which provide the best opportunities to accept interventions.

Sl. No.	City	Score
1	Bangalore	9.9
2	Chitradurga	2.9
3	Tumkur	5.5
4	Mysore	5.2

City	Ranking
Bangalore	1
Tumkur	2
Mysore	3
Chitradurga	4

Table 14: Cumulative Scoring and Ranking List

Thus, Bangalore is chosen to be the city for implementing this project. Moreover, since the project team is based in Bangalore, it is more feasible for the team to work in Bangalore. The cumulative scoring and ranking list is shown in table 15.

3. Annexure I - City Profiles[10]

Bangalore

Bangalore, official name Bengaluru, is the capital city of the Indian state of Karnataka. Located on the Deccan Plateau in the south-eastern part of Karnataka, Bangalore is India's third most populous city and fifth-most populous urban agglomeration. Bangalore is known as the "Silicon Valley of India" because of its role as the nation's leading information technology (IT) exporter. Located at a height of over 3,000 feet (900 m) above sea level, Bangalore is known for its pleasant climate throughout the year. The city is amongst the top ten preferred entrepreneurial locations in the world.

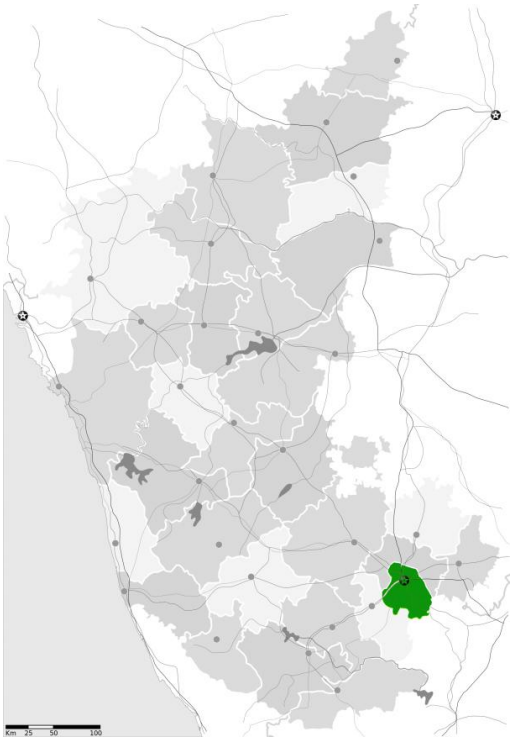

Figure 3: Bangalore

Bangalore lies in the southeast of the South Indian state of Karnataka. It is in the heart of the Mysore Plateau. It is located at 12.97°N 77.56°E and covers an area of 741 km^2 (286 sq miles). The majority of the city of Bangalore lies in the Bangalore Urban district of Karnataka and the surrounding rural areas are a part of the Bangalore Rural district.

The Bruhat Bangalore Mahanagara Palike (BBMP, Greater Bangalore Municipal Corporation) is in charge of the civic administration of the city. It was formed in 2007 by merging 100 wards of the erstwhile Bangalore Mahanagara Palike, with seven neighboring City Municipal Councils, one Town Municipal Council and 110 villages around Bangalore. The number of wards increased to 198 in 2009

According to a report submitted to the WB by Karnataka Slum Clearance Board in 2012, Bangalore has 862 slums from total of around 2000 slums in Karnataka. The families living in the slum are not ready to move into the temporary shelters. 42% of the households migrated from different parts of India and 43% of the households had remained in the slums for over 10 years. The Karnataka Municipality, works to shift 300 families annually to newly constructed buildings. One third of these slum clearance projects lack basic service connections, 60% of slum dwellers lack complete water supply lines and share BWSSB water supply.

[10] Wherever primary data was not accessible, and where city visits did not yield required data, references were sought through secondary data collection means, which basically included internet research of relevant documents like City Sanitation Plans, City Development Plans, Govt. websites, scholarly articles, blogs, etc.

With an estimated population of 9.6 million according to Census 2011, Bangalore is the third most populous city in India.

Sanitation Status

Bangalore's rapid urbanization has also meant growing mountains of waste. City municipal engineers estimate that roughly 1,000 MLD of wastewater flows through its three valleys – the Vrishabhavathi, the Koramangala-Challaghatta, and the Hebbal. The city's sewage generation estimates vary widely, indicating that authorities have poor knowledge about the actual water consumed by the population. The actual amount of sewage generated would be higher since a large number of private borewells exist and there is no scientific estimate of the quantity of water withdrawn from them.

Bangalore's sewerage system has been developed along its major drainage lines, but this is highly inadequate for a city as big and as rapidly expanding as Bangalore. The total trunk sewer is 243 km (smaller drains are around 3,367 km), all of which are mostly in the core old municipality areas of the city. The remaining areas of the city, which also include less- developed parts like slums, revenue pockets and unauthorized colonies, do not have any sewerage facilities. Slum dwellers and the urban poor draw their water from open sumps and wells, which contain water of dubious quality and therefore, not fit for human consumption. Outbreaks of water-borne diseases and malaria are common in these areas. While Bangalore's first sewage network was developed as early as 1922, treatment of wastewater started only in 1974. The city has since then built many STPs. By2010, there were 14 plants with an installed capacity to treat 721 MLD – roughly equivalent to what the city generates. But in spite of this hardware, the city only uses half the capacity – it treated some302 MLD of waste in its sewage plants in 2010. In other words, a substantial part of the sewage goes untreated. It is no surprise then that the water bodies of the city, its official conveyance zones, are so polluted.

But the city certainly has ensured that it keeps its reputation for being the technology centre of the country, even when it comes to sewage treatment. It has experimented with and built several kinds of sewage treatment system, becoming a ready laboratory for these technologies in the country. But in spite of these impressive wastewater treatment facilities, it continues to struggle with the management of its sewage because it does not have the drains to bring the sewage to the plants. It faces the same problems as that of most cities – outdated sewage infrastructure, which demands repair and refurbishment even as more needs to be built. It is not able to trap its waste and convey it to the treatment plants.

The city is now drawing up massive plans for rebuilding and extending its sewage network. According to the estimation of the city's authorities, it needs to build more than what it has built till date. Till it completes these grand plans, the pollution of its water bodies will prevail. The state of the Bellandur Lake, for instance, is dismal

because of the sewage that makes its way into the lake. Its people are fighting to find solutions.

Hubli – Dharwad

Hubli is located between 15° 11' - 15° 31' North Latitude and 75° 01' - 75° 28' East Longitude at an altitude of 630 m above sea level while Dharwad is between 15° 19' - 15° 41' North Latitude and 75° 15' - 75° 36' East Longitude at an altitude of 700 m above sea level. Located at about 480 km north of Bangalore and separated by a distance of 20 km.

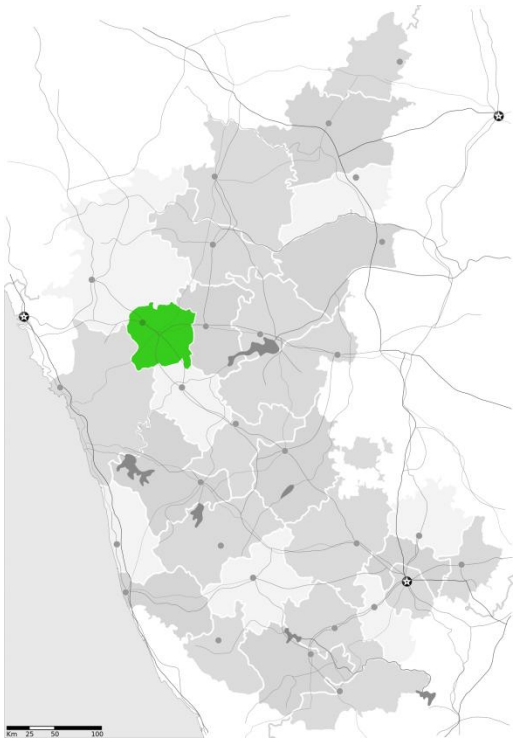

Figure 4: Hubli - Dharwad

Sanitation status

The existing underground drainage coverage is only about 50% in Hubli-Dharwad. The sewerage system covers 60% of Hubli and 40% in Dharwad. The sewage is discharged into natural streams due to absence of treatment facilities. The discharge is directly used by the farmers for irrigation purposes. The peripheral villages and revenue pockets included within the municipal limits do not have access to sewerage system. New layouts are developed by Karnataka Industrial Area Development Board (KIADB), Karnataka Housing Board and HUDA. The households in these layouts largely depend on individual septic tanks for human waste disposal.

However, the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) are in the process of preparing the DPR for the treatment plant located in Gabbur. The plant will treat 40 MLD of wastewater from Hubli and 20 MLD from Dharwad. The present wastewater generation is 120MLD.

The length of sewerage network is 556 km covering an area of 54 km^2. The population covered by underground drainage network is 4.2 lakhs. The existing network covers a part of South Hubli and west and central Hubli. Most of the areas beyond the railway line are not served by the sewerage network. In case of Dharwad, the network only covers areas of old Dharwad, central zone and northeast areas. The newly developed areas /extension areas along Gokul road, Bijapur road, Gadag Road, Nekar colony and some parts of Old Hubli, Karwar Road and entire Navanagar area are not served by the sewer network.

The municipal corporation owns eight desludging vehicles. The households call the corporation when they require desludging their septic tanks. The corporation charges Rs.1000 per trip i.e. Rs. 1000 per 3000 liters. Presently, there are no private players in

the O&M sector. The sludge is then dumped in the solid waste dump site. The solid waste department of the corporation handles the septage management. The sludge is at times mixed with the organic waste and converted to compost. This is not a regular activity.

Mysore

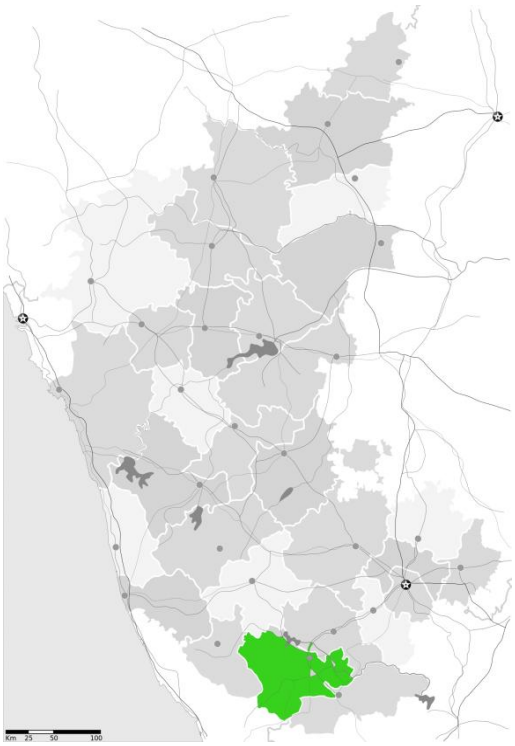

Figure 5: Mysore

Mysore is the third-largest city in the state of Karnataka, India, located at the base of the Chamundi Hills about 150 km southwest of the state capital Bangalore, it is spread across an area of 130 km^2. According to the provisional results of the 2011 national census of India, the population of Mysore is 9,20,550 and since Mysore is a tourist place the floating Population is around 25 lakhs/annum. Mysore City Corporation is responsible for the civic administration of the city, which is also the headquarters of the Mysore district and the Mysore division. Mysore is located at 12.30°N 76.65°E and has an average altitude of 770 meters. It has several lakes, such as the Kukkarahalli, the Karanji and the Lingambudhi lakes. In 2001, total land area usage in Mysore city was 39.9% residential, 16.1% roads, 13.74% parks and open spaces, 13.48% industrial, 8.96% public property, 3.02% commercial, 2.27% agriculture and 2.02% water. The city is located between two rivers: the Kaveri River flows through the north of the city and the Kabini River, a tributary of the Kaveri, lies to the south. Drinking water for Mysore is sourced from the Kaveri and Kabini rivers. As of 2011, Mysore gets 160 MLD water per day.

Sanitation status

There are 69 slums in Mysore. ASCI have done the CSP for Mysore. 90.85 % of the houses in Mysore are connected to the Underground Drainage (UGD). 6% of the houses have septic tanks. Rest of the houses either has pit latrines or they opt for open defecation. The UGD runs over a stretch of 740 KM and Mysore has 3 STPs in total with a cumulative capacity of 157.65 MLD. These STPs are basically Aerated Lagoons. They reuse the treated wastewater in maintaining golf course and for irrigational purposes.

The maintenance cost for running the STPs was 735 lakhs for the year 2012-13. The ULB owns two units Sucking Machine with a capacity of 4000 liters each. The sludge is disposed to MSW sites. During the city visit it was also noticed that there are private vehicles which also carry out desludging of septic tanks.

Belgaum

Belgaum is the fourth largest city in the state of Karnataka spread over about 95 sq.km is located at a distance of about500 km Northwest of Bangalore. The Belgaum City was convertedintoaMunicipalityintheyear1851andthefirstelectionforBelgaum Corporation (BCC) was conductedin1983with58 wards. The population of BCC as per Census 2011 is 4.88 lakhs (with 1.09 lakh households) out of which about 10% live in 51 slums.

Sanitation Status

Currently, about only 45% of the core city area has been connected through an UGD system with the remaining households using septic tanks for onsite sanitation. A sanitation project of about INR 200 Crores is under implementation to provide UGD connections to the remaining part of the city and setting up of a 75 MLD Sewage Treatment Plant. A City Sanitation Plan has been prepared by ASCI, Hyderabad.

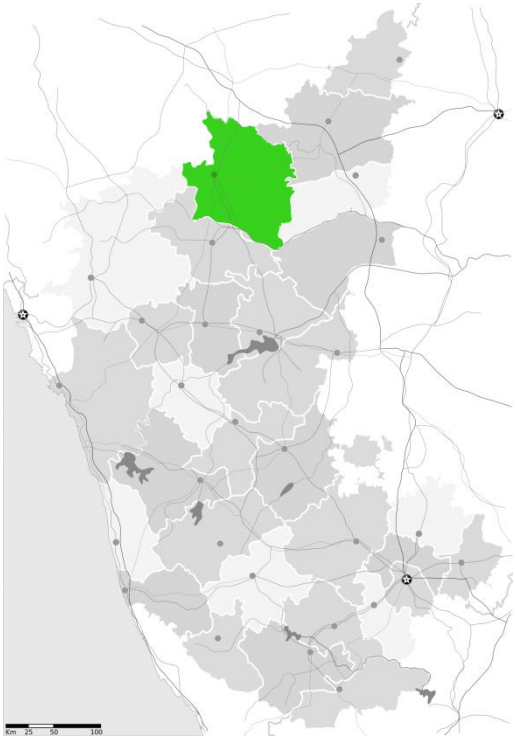

Figure 6: Belgaum

BCC is in possession of one suction and jetting machine of 8000 liter capacity (requisition for procurement of one more has been placed to DMA), one tractor mounted jetting machine of 3000liter capacity and two truck mounted suction machines of 5000 liter capacity. These machines extract the septage from households which are not serviced by UGDs and dispose the collected septage in the Bellary Nala. The city does not have an STP yet. The charges for extraction of septage from septic tanks are INR 1200 per extraction for city areas and INR 1500 for the outskirts. The requests are cleared on the same day by BCC. No private operators are functional in the city.

There are 4 public toilets constructed by BCC at INR 10-15 lakhs per complex of 8-10 seats capacity which are functional in the city on a pay and use basis at INR 2 per use. All are operated by private contractors. The maintenance of these toilets is not up to the mark with only about 2 being completely functional and in a usable condition. The others are facing issues of non-payment by users or insufficient number of users. Rotary club is in the process of constructing 6 more public toilets on a pay and use basis in different locations in the city. There are 43 community toilets in various wards of BCC, of which 20 are maintained by BCC and the remaining by private contractors. Of the 43 toilet complexes, 4 are not working and the remaining are working but found to be in average conditions. Improper maintenance of the community toilets is also cited as a major factor for resorting to open defecation by

the users. BCC has recently undertaken rejuvenation of the old existing wells in and around the city to provide water supply to the nearby catchment area. These wells have small treatment units attached and are costing INR 0.75/liter as compared to INR 10/liter for water supplied from WTP. As the current sullage is let off into open nalas flowing across the city, a DPR has been prepared for construction of SWD at cost of INR 65 Crore.

Mangalore

Mangalore, Karnataka, is the chief port city of the Indian state of Karnataka. It is located about 350 kilometers west of the state capital, Bangalore. Mangalore lies between the Arabian Sea and the Western Ghats mountain ranges, and is the administrative headquarters of the Dakshina Kannada (formerly South Canara) district in south western Karnataka. With its pristine beaches, broad roads and calm localities this coastal city was declared the eighth cleanest city in India. Mangalore ranked India's 13th place in top business destination and in Karnataka it's second after Bangalore. It developed as a port on the Arabian Sea – remaining to this day, a major port of India. Lying on the backwaters of the Netravati and Gurupura rivers, Mangalore is often used as a staging point for sea traffic along the Malabar Coast. The city has a tropical climate and lies in the path of the Arabian Sea branch of the South-West monsoons. Mangalore's port handles 75 per cent of India's coffee exports and the bulk of the nation's cashew exports. Mangalore is located at 12.87°N 74.88°E in the Dakshina Kannada district of Karnataka. It has an average elevation of 22 meters above mean sea level. It is the administrative headquarters of the Dakshina Kannada district, the largest urban coastal center of Karnataka, and the fourth largest city in the state. The Mangalore City Corporation (MCC) is the municipal corporation in charge of the civic and infrastructural assets of the city. Municipal limits begin with Mukka in the north, to Netravati River Bridge in the south and western sea shore to Vamanjoor in the east.

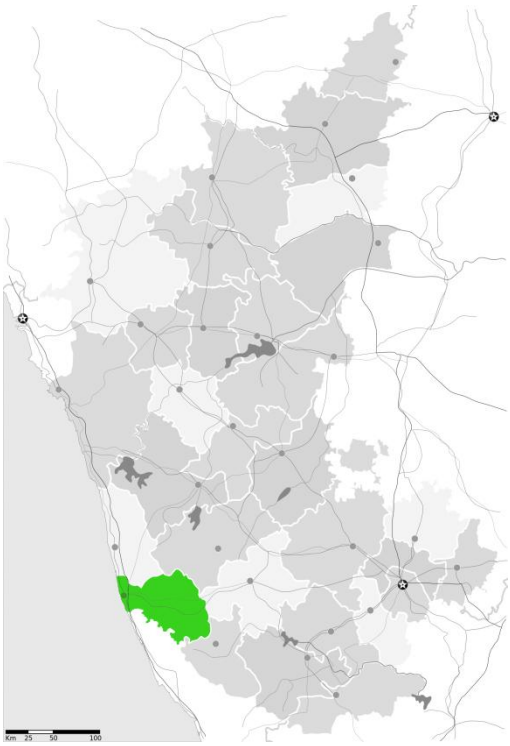

Figure 7: Mangalore

Sanitation status

The current population of Mangalore is approximately 5 lakhs. Mangalore is covered by 80-90% of UGD network. But the officer interviewed stated that these figures quoted are inflated and in reality, it is around 50-60%. The first UGD laying took place in the year 1969. The total length of UGD then was 150-160 kilometers. From the year

2000-12 under KUDCEMP scheme (Courtesy loans from ADB) 360 kilometers of UGD has been laid. According to figures only 6 kilometers are left. However, the work has been pending as the UGD has to cross through railways, national highways etc. Under the same scheme, construction of wet wells and Sewage Treatment Plants are still pending.

There are total 4 STPs in Mangalore. The cumulative capacities of the STPs are 89 MLD. 1 STP works on the UASBR technology. The remaining 3 STPs work on the Extended Aeration-Activated Sludge Process. The 4 STPs are maintained by MSEZ. They will utilize the treated wastewater from 3 STPs for industrial purposes. The treated effluent from the 4th STP will be diverted to amusement park and a golf course. MSEZ and MMC have signed an agreement and the cost of maintaining sanitation infrastructure would be shared in a 70-30 ratio respectively. The wet wells and STPs would be maintained by MSEZ. The STP effluents are meeting the norms set by KSPCB. Owing to terrain (a few places in Mangalore are below Mean Sea Level) 10-20% of the area may not be served by UGD. The population here will be served by septic tanks and soak pits. There is no special program sanctioned for sanitation in Mangalore. The electricity charges to maintain the centralised sanitation infrastructure vary between 6-12 crores. The different forms of sanitation infrastructure include septic tanks, soak pits and pit latrines. Even though UGD coverage exists, a part of the population hasn't connected to the sewer networks. They have connected to storm water drains instead. Public toilets in Mangalore are connected to UGD. There are totally 21 slums of which 8 are notified, the rest non-notified. These slums have sanitation infrastructure in terms of pit latrines. There are 3 private septic tank desludging providers. The MMC charges them INR 200 per load they dispose in the wet wells. MMC charges INR 750 per load to septic tank users. There are no different slabs for different users. Private operators charge INR 1300 per load to septic tank users. The 3 private service providers have 8 numbers of vehicles. The capacity of desludging vehicle available with MMC is of 6000 liters capacity. The septic tank owners when they are to be provided with the emptying service should pay to MMC in cheque/DD. The MMC currently has 3 desludging (sucking and jetting) vehicles of which 1 is under repair. A new vehicle has been tendered for. The private operators are currently adhering to MMC directive of dumping the septage in the wet wells. MMC also feels the numbers of vehicles are enough to cater to the demands of the people. There are 2 Sludge Drying Beds in STPs. During the monsoon, the sludge is stored in sludge storage tanks. The dried sludge later is sold to farmers as compost. The operation and maintenance of UGD also has been mechanized now. There are 12 equipments owned by MMC which aid during UGD works. No manual labor required.

Gulbarga

Gulbarga is a city in the North-East part of Karnataka, 200 km from Hyderabad and620km north of Bangalore. It is spread over 64 km^2 and divided into55 wards for better administration under the Gulbarga City Corporation (GCC).The population of the city is 5.32lakhs with 99,312 households out of which10% of them reside in the existing 61 slums.

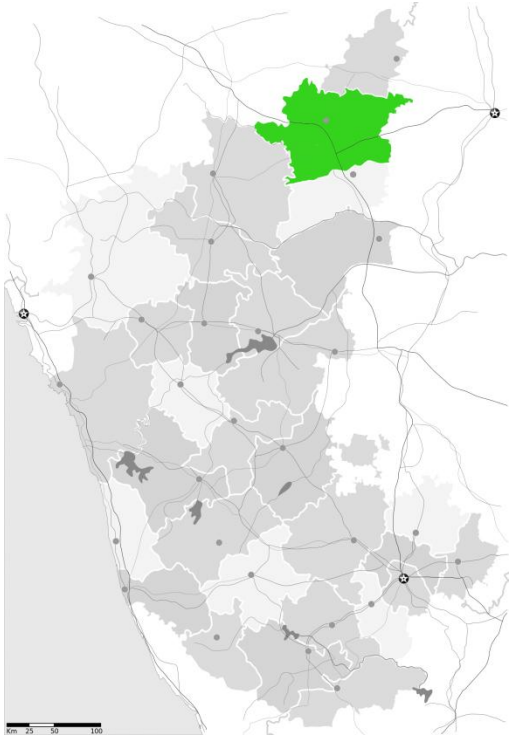

Figure 8: Gulbarga

Sanitation Status

At present, Gulbarga city is partly covered by underground sewerage system. About4500-5000 households are connected with UGD which covers about 5 per cent of the total Household according to 2011. The system is still under construction and GCC is trying to implement onsite sanitation for the newly constructed buildings. It is the individual household responsibility to construct toilet along with septic tank as per the specifications given in building bylaws. However, these are not fully being implemented and most of the households' wastewater is connected to the storm water drain. It is observed that about 40% of the slum & Non-slum households without toilets are mainly using Public toilets. However, these toilets are very poorly maintained. Also majority of the slum HHs practice Open defecation (about 50 per cent households). Public pits and septic tanks also exist, though in small percentages.

The quantity of sewage reaching the sewage treatment plant is meager as most of it is let out into the open drainage. Also farmers from surrounding villages lift raw sewage from the outfall sewer. GCC has three suction machines which are used to clean the septic tank sludge from the households. An amount of INR 2000 - 3000 is charged from the households at the time of clearance. Since the open drains are usually clogged with solid waste, it leads to stagnation and backwash in some low lying areas turning the drains into mosquito breeding zones.

The existing 27.27 MLD STP in Gulbarga is designed to serve a population of only 3 lakhs though only 10% of sewage is flowing into the STP. With the increasing population and considering treatment of sewage of surrounding unserved regions, another STP of 58.45 MLD capacity is being planned at Nandikur village which should suffice the region till year 2026.

Davanagere

Davanagere city is located at a distance of about 260 km from the state capital of Bangalore in the central part of Karnataka. It is spread over 70 km^2 and divided into 41 wards for administration by the Davanagere City Corporation (DCC) which was formed in the year 2007.The population of Davanagere city as per Census 2011 is 4.35 lakhs with 92, 607 households out of which 13% reside in slums.

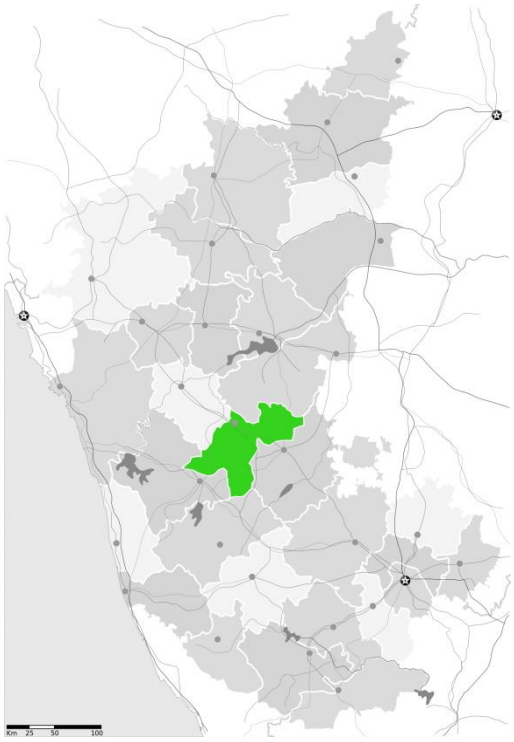

Figure 9: Davanagere

Sanitation Status

Drainage system in the city is comprised of 60% UGD networks and rests are open drainage. Except a few localities in the outskirts, most of the core wards have a fairly good UGD network.DCC has 3 sucking and jetting machines which are used to clean the septic tanks. DCC receives on an average around 20 calls per week for clearing of sewers. The jetting and sucking machines are operated between 6.00 am to 6.00 pm. The fecal sludge extracted is discharged into the existing UGD network and conveyed to the STP. There is an STP of 14.8 MLD capacity near Shivanagar in Davanagere town and the treated sewage is being discharged into BathiKere (Tank) on the outskirts of the city. There is a proposal to set up another STP of 20MLD capacity near BathiKere to cope with the sewage discharge from the city.

There are in total around 32 public toilets around the city out of which only about 8 are functional and are being maintained by M/s. Sulabh international.

Bellary

Bellary also called the 'Steel City of the South' is located in the North-Eastern part of Karnataka at a distance of 300 km from state capital Bangalore, bordering Andhra Pradesh. The city famous for the Bellary fort, is spread over an area of 82 km^2 and divided into 35 wards and administered by the Bellary City Corporation (BCC).The city has a population of city has population of 4,09,644 with 84, 844 households out of which 21% live in slums. The city is an important wholesale and retail trade centre of

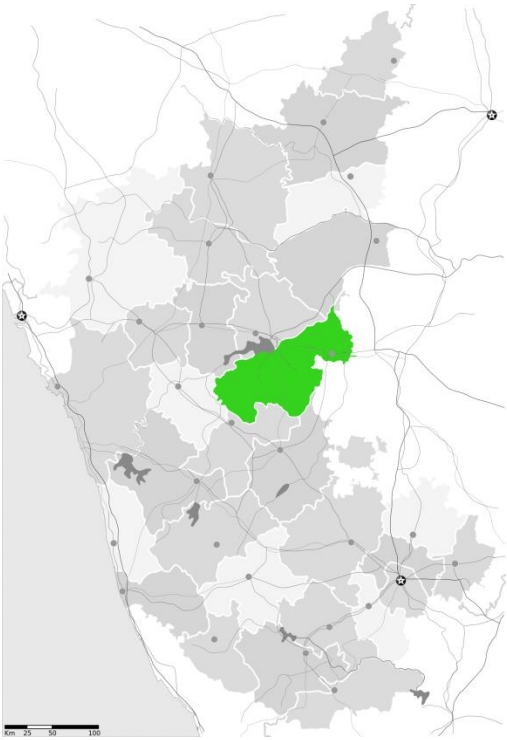

Figure 10: Bellary

the district and surrounding regions. The city has been growing at a faster pace in all the wards simultaneously. The wards are moderately to highly populated with increasing residential growth which indicate a growing need for provision of all basic urban amenities.

Sanitation Status

Though the city boasts of having 97% of households being covered with tap water connections, around 30% do not have toilet facilities within premises. About 70% of the core city area has been connected through an Underground Drainage (UGD) system with the remaining households in the newly developed out growths using septic tanks for onsite sanitation. It has been found that in some places the residents are not willing to take sewer connections as the BCC charges Rs240/- per year for UGD connections from residents and INR1200/- per year from commercial establishments per floor. Open defecation in Bellary is quite rampant. However, this could be due to lack of proper infrastructure facilities and behavior of people who are acclimatized defecating in open areas. Particularly it is observed that children are into habit of defecating in open. Of the total 35 wards in the city, around 20 wards were observed with low to high occurrence of open defecation. BCC has 2 jetting machines and 1 suction machine of capacity 10,000 liters. Once the septic tanks get filled up the residents make a call to BCC and the BCC dispatches theses machines to clean the same. There is also one private operator who caters to the entire city in case of non-availability of BCC's machines. The charge for cleaning of septic tank ranges between INR 500-1500 and as per BCC, around 750-1000 septic tanks are cleaned in a year. The average collections per month from these machines are INR 3.00 lakhs. The vacuum tankers which extract the septage discharge it in the running manholes or the wet wells (collection ponds for sewage/septage) designated by BCC. Trips of each vehicle is planned in such a way that all the complaints are addressed to within 24 hours.

A 30 MLD STP (aeration pond) is functional with another 15 MLD capacity being built on outskirts of city, the networking for the same is under progress and entire project is being maintained by the BCC.

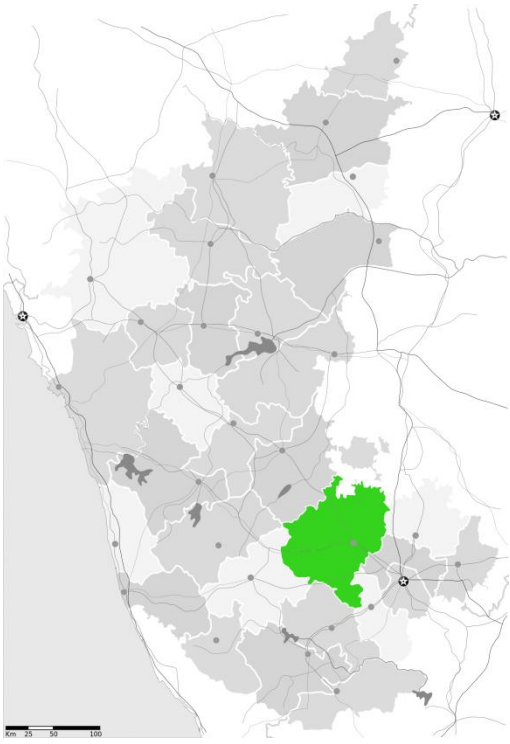

Figure 11: Tumkur

Tumkur

Tumkur is a town in the southern part of the Indian state of Karnataka. Tumkur has a total area of 49 km^2. The city of Tumkur is located at a distance of 70 km northwest of Bangalore, along National Highway 206 and it is also accessible by train. Tumkur has a current

population of 3,05,821. There are 35 municipal wards and 37 slums out of which 22 are notified and 15 are not notified. The city has a total budget of 60 crores out of which 25-30% is used for sanitation purpose. The city has a total water supply of 30 MLD and a per capita supply of 85 lpcd. The region does have a PCB.

Sanitation status

Currently, the Tumkur City Municipal Corporation (CMC) is responsible for the sanitation of the city. Mr. Ashaad R Shariff, the commissioner of Tumkur, was supportive about this project. He then introduced us to Mrs. B R Sowmya (environmental engineer) who is in charge of the sanitation department (health section). The information collected from her was very useful. At present the City has a few projects regarding sanitation. For example, a CSP is being elaborated, but not yet finalized. Tumkur CMC is also focusing on Solid Waste Management, at the moment the DPR is being prepared. For the next 40% of the DPR the work order already has been given. For the solid waste a landfill site exists.
40% of the city area is covered by UGD; the KUWSDB is preparing a DPR for the missing 60% of the city area. At the moment there is an existing STP with a capacity of 24.5 MLD in Bhimsandra, another STP is being constructed and shall be commissioned within the next 1-2 years. At city level, septage is managed in this way: people who want to have their soak pit or septic tank cleaned can forward their grievance to control room and within 3-4 days a jetting machine will come. CMC charges Rs. 1,000 per load. At the moment the ULB owns one machine with a capacity of 4000 liters, one machine is outsourced and another machine is to come. Mrs. Sowmya also mentioned that there are private players who collect sludge from the soak pits and the septic tanks. Vehicles charged by Tumkur CMC are supposed to dispose the septage in the STP but unfortunately they will dump the septage at nearby fields in cooperation with local farmers.

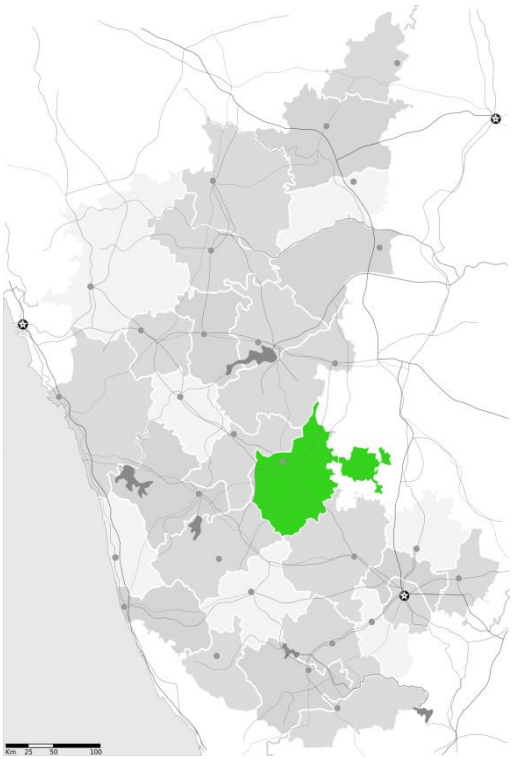

Figure 12: Chitradurga

Chitradurga

Chitradurga is a town in the southern part of the Indian state of Karnataka. Chitradurga has a total area of 22 km^2. City of Chitradurga is located at the junction of NH-4 (Bangalore-Pune National Highway) and NH-13 (Sollapur-Mangalore National Highway). Chitradurga is also accessible by train. There is a daily service to Bangalore. Chitradurga has a current population of 1,39,914 (Slum Population : 67,656). There are 35 municipal wards and 45 slums out of which 25 are notified and 20 are not notified. The city has a total budget of 6 crores INR out of which 2 crores INR is used for sanitation purpose (mainly for managing the

solid waste). The city pumps its water supply from Shantisagar and Vanibillasa which are 60kms away from the city. 10Mld of water is supplied for 1-2hours per day over a distribution network of 23,270 m. The city has a per capita supply of 71 lpcd. The region does have a PCB.

Sanitation status

Currently, the Chitradurga Municipal Corporation (CMC) is responsible for the sanitation of the city. Mr. Ravindra B Mallapur, the commissioner of Chitradurga was very supportive about this project. He then introduced us to Mrs. Sneha (environmental engineer) who is in charge of the sanitation department (health section); the information collected from her was very useful. At present the households in the city have their own individual toilets which are mostly connected to the storm water drain running across the road. Some of the houses also have septic tanks with soak pits. The city in spite of having 6 public toilets faces a lot of open defecation. The main challenge in the city is lack of awareness among the people. Although having all the infrastructures, people do not use them. The solid waste is collected by the government jeeps and autotipus. Compactors and decompressor are used for transportation. The CMC has 2 sucking machines (shown in figure 3) for the pit latrines. People who want to clean their soak pits need to write an application addressing the commissioner of CMC and pay Rs. 1,500 per load (depending on the size of the soak pit). The municipal corporation then sends its vehicles to the pit to collect the septage and then it is dumped at the Malapur Lake. The whole process takes 1 day from the day of filling the application. At present the sludge is not reused, but there are plans for reusing it in the future. The city does not have any private honey – suckers.

Chitradurga is coming up with a 100% underground drainage network which is already sanctioned by Karnataka Urban Water Supply and Drainage Board (KUWSDB); it will be implemented in the upcoming two years by iDeCK. The City Sanitation Plan was done by State Institute for Urban Development (SIUD) Mysore. The UGD will be connected to a STP (Sequential Batch Reactor) which is located 2kms away from the city. The STP will be designed for both wastewater as well as for septage. The STP is designed for the whole city spreading over an area of eight acres. The city in the future has plans to outsource the operation and maintenance of the UGD network. The city is planning for Build Operate and Transfer (BOT), they will submit a proposal to DMA and later on there will be a tender wise bidding for outsourcing of Operations and Maintenance activities of the UGD network.

Mandya

Mandya is a city in the state of Karnataka, India. It is the headquarters of Mandya district and is located 40 km from Mysore and 100 km from Bangalore. Mandya is the first place to introduce Hydro - Electrical Power Supply in Karnataka. Mandya is located at 12.52°N 76.9°E. It has an average elevation of 678 meters. The Mysore Sugar Company Ltd. is located in the heart of Mandya City. It is one of the oldest sugar factories to be set up in Karnataka. It has a processing capacity of 5,000 tons of cane per day and was established in 1933-1934. As of 2001 India census, Mandya had a population of 1,37, 735.

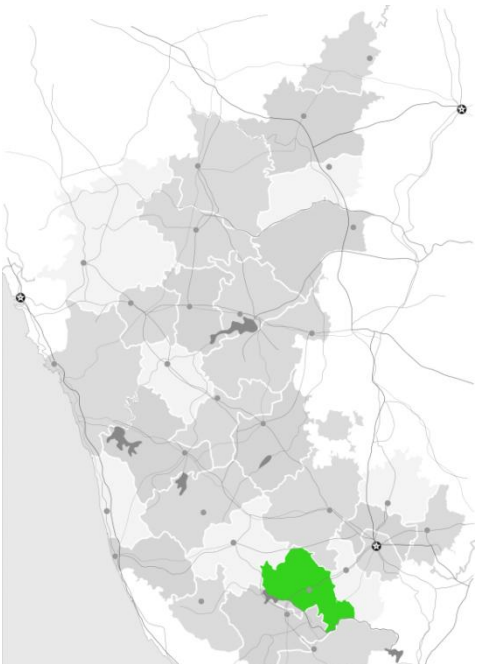

Figure 13: Mandya

Sanitation status

There are 24 Slums under the city municipal corporation. There is no city sanitation plan as of now. 80% of town is covered by UGD and there is future plan of construction of UGD for the rest of the city. At present there are 2 STPs running from 2008 with a capacity of 9.65 and 8.9 MLD. The treated wastewater goes to nearby valley for irrigation. The city has a total sanitation budget of 5.1 crore INR.

Udupi

Udupi is a town in the south-west of Karnataka. It is the headquarters of Udupi District. Udupi is notable for the Krishna Temple, and lends its name to the popular Udupi cuisine. Udupi, also known as Rajata-Peetha and Shivalli (Shivabelli), a centre of pilgrimage, is situated about 60 km north of Mangalore and about 420 km north-west of Bangalore. As of the 2011 India census, Udupi had a population of 1,25,350 spread across 70 km^2. of its municipal limits. National Highway NH 17 passes through Udupi. Other significant roads include the State Highways to Karkala and Dharmastala and to Shimoga and Sringeri. The NH-17 provides a link to Mangalore and Karwar via Kundapur. Private as well as government buses connect Udupi to various parts of Karnataka. Udupi has a railway station

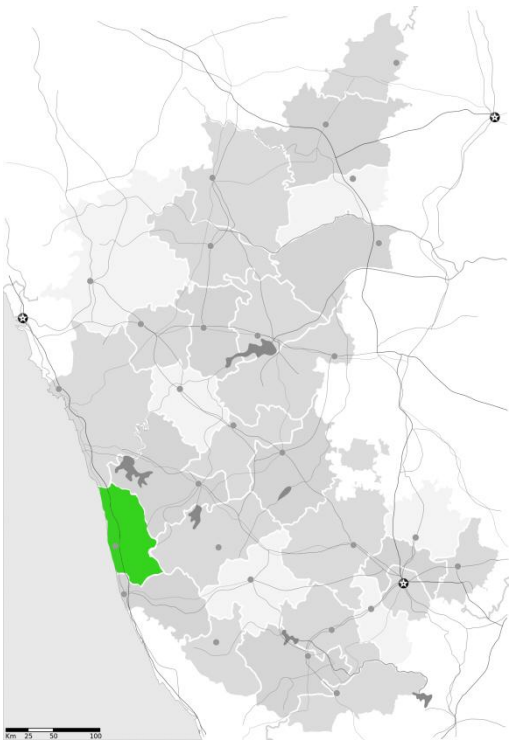

Figure 14: Udupi

on the Konkan Railway.

Sanitation status

Sanitation is a municipal responsibility serviced by its Environment and Health department of the Udupi CMC. The city has a STP of 12 MLD capacity commissioned in the year 2007. But the sewage reaching the plant is to the tune of 6 MLD. The length of the existing UGD network is 90 kilometers. The total area covered by UGD is 25%. The remaining areas are served by septic tanks and soak pits. But of the mentioned two treatment systems, the latter is more. There are totally 32,000 households in the city. Roughly only 12000 households are covered by UGD. The city of Udupi does not have a CSP. The O&M of the Sewage Treatment Plant has been outsourced. There are 6 members who look after the O&M. The treatment systems employed in the STP include Clarifier, Trickling Filter and a Facultative Aerated Lagoon (FAL). The challenges in maintaining the STP include the foul odor emanating from the lagoon. There is no buffer zone (500m buffer zone mandated) around the STP. Udupi CMC has 2 numbers of sucking and jetting machines. The vehicles have capacity of 4KL and 6KL respectively. Different slabs exist for different range of users of onsite sanitation services. Households are charged around INR 2000 per trip whereas commercial establishments are charged INR 5000 per trip. Additional revenue is earned by making extra trips which approximately amounts to Rs, 2,50,000 per month. There are no private desludging players in Udupi.

Chamaraj-Nagar

Chamaraj-Nagar has a total population of 70,000 with 24 Slums under the ULB. The City has a total budget of 80 lakhs INR for maintenance of sanitation infrastructure. The city also has a funding of 3913 lakhs from ADB for sanitation. The city has UGD coverage of 105 km out of which 65 km has not been constructed yet. The main challenge that the city is facing in terms to sanitation are land acquisition for UGD and the disposal of grey water in storm water drain.

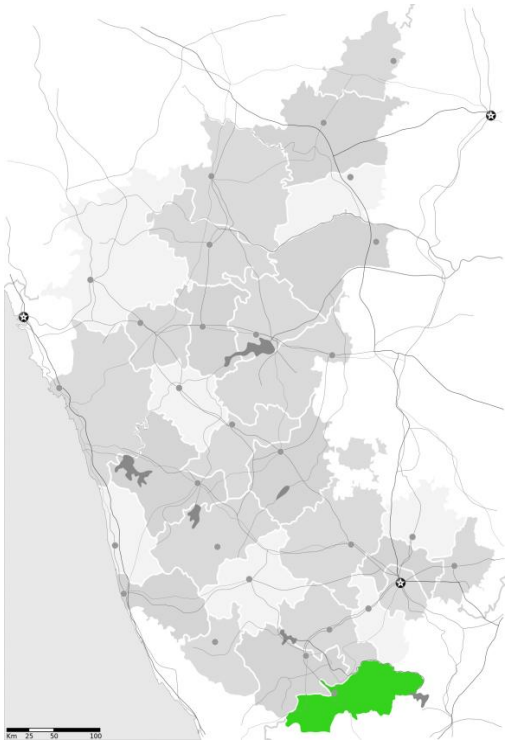

Figure 15: Chamaraj-Nagar

Sanitation status

The ULB owns one unit desludging vehicle with a capacity of 3000 lit. The city municipal corporation charges Rs. 500/trip within Chamaraj Nagar and Rs. 750/trip outside of Chamaraj Nagar. The vehicle generally makes 4-5 trips/ month. The sludge is disposed outside of the town to a landfill area pit. However, as at least 50% of the population is agriculture-based selling it to farmers could be an option.

Madikeri

Madikeri is a hill station town in Karnataka. Also known as *Mercara*, it is the headquarters of the district of Kodagu (also called Coorg). It is a popular tourist destination. As of 2001 India census, Madikeri had a population of 33145. This town is situated at an elevation of over 5000 ft above sea level. Madikeri is located at 12.42°N 75.73°E. Madikeri lies in the Western Ghats and is a popular hill station. The nearest cities are Mangalore to the west and Mysore to the east.

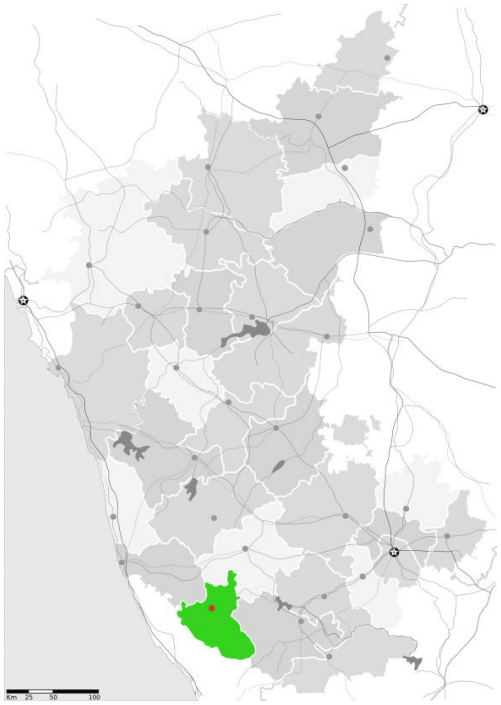

Figure 16: Madikeri

Sanitation status

There are 4 slums under the ULB. The total city budget is approximately 51 crores. The city has a budget for water supply maintenance of Rs. 2 crore. Madikere is planning to have a 100% UGD coverage. KUWSDB is responsible for the construction of UGD and the city municipal corporation will be responsible for the maintenance. Rs 66 crore has been approved for the construction of UGD under the supervision of CMC. Land acquisition for a 4.5 MLD STP is under progress.

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4. Annexure II – Project Key Milestones

RESULTS FRAMEWORK – KEY MILESTONES

BILL & MELINDA GATES foundation

Objective #	Key Milestones
Objective 1	**Support city and concerned departments of state government to implement O&M related recommendations of relevant policies and advisory notes, such as the septage management advisory note, for decentralized sanitation infrastructure.**
Milestone -1	Compile and assess technical and institutional landscapes and governance structures of prevailing O&M practices for urban decentralized sanitation infrastructure, identify needs and conduct corresponding gap analysis.
Milestone- 2	Develop a business model (linked to revenue model to meet the expenses) to provide training courses on the new O&M approaches servicing decentralized sanitation infrastructure.
Milestone-3	Develop key O&M service packages (SOP, manuals, equipments and skills requirements, Service Description Price, delivery time etc.) in coordination with relevant agencies and stakeholders.
Milestone-4	Memorandum of Understanding or Expression of Interest from relevant city agency is obtained.
Milestone -5	The targeted city has adopted and implemented a new policy for O&M of decentralized urban sanitation infrastructure.
Objective 2	**To improve the overall effectiveness and efficiency of O&M services for decentralised urban sanitation infrastructure.**
Milestone-6	Tools are available for end-users to access services of certified service providers.
Milestone-7	Certified service providers for O&M are operational with increased service efficiency and effectiveness due to application of new O&M tools and techniques.
Milestone-8	500 owners of decentralized sanitation infrastructure receive improved O&M services.
Objective 3	**To disseminate knowledge of new approaches to O&M of decentralized urban sanitation infrastructure to state level decision makers and other cities.**
Milestone-9	City decision makers in Karnataka are aware and informed (through participation in workshop and in person meeting with project staff) about O&M requirements for decentralised urban sanitation infrastructure and have been exposed to the new O&M policy adopted and enforced by the targeted city in Karnataka.

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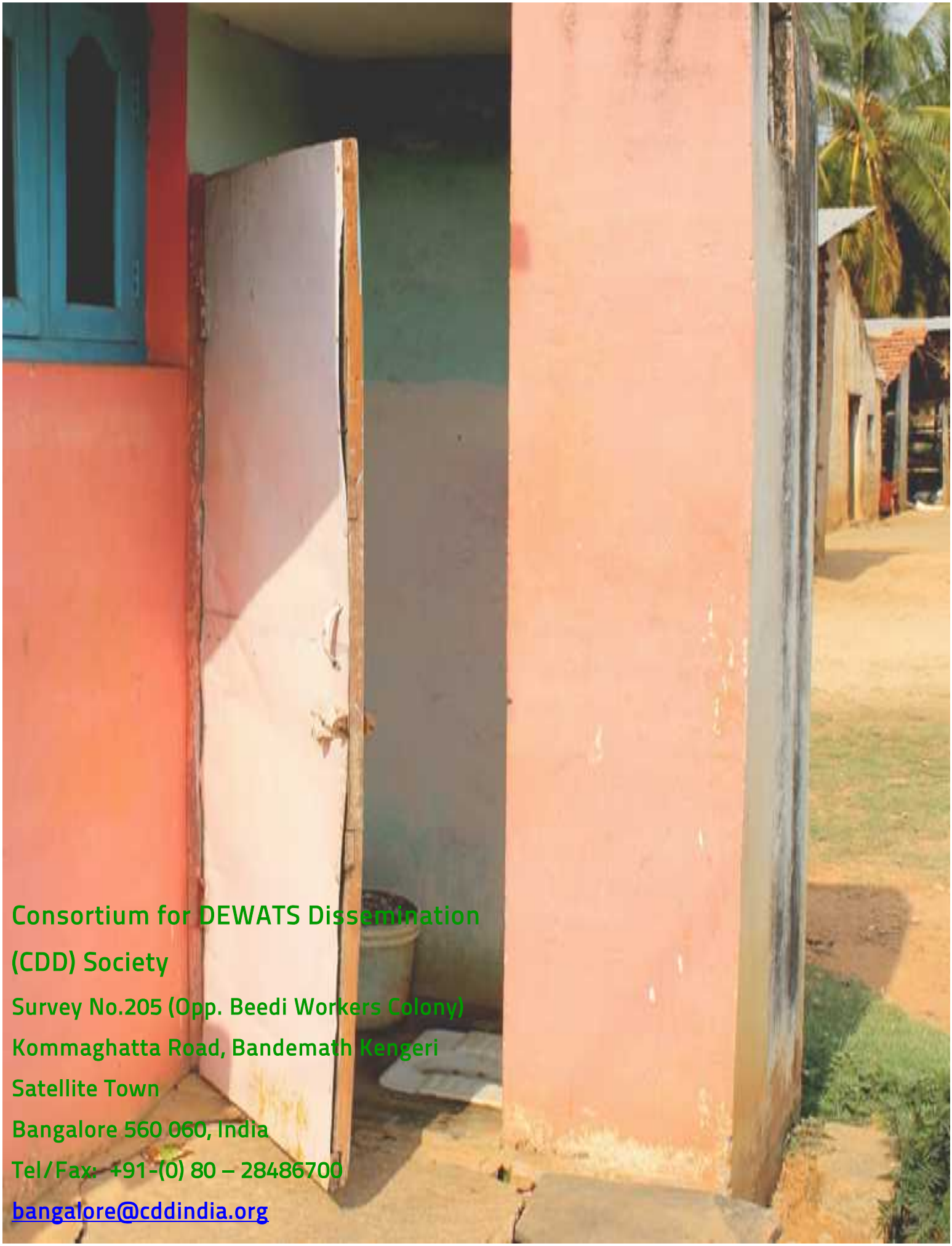

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