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In Cooperation with
Government of Kerala, Andhra Pradesh and Telangana

Introducing City Sanitation Plan: Practitioner's Manual

About GIZ India

For over 60 years, GIZ has been working jointly with partners in India, in sustainable economic, environmental and social development. Currently, GIZ has over 300 staff in India, of whom 85% are national personnel.

India is fast emerging as an economic and industrial power. It is a member of the Group of Twenty (G20), and of the BRICS-Association of major emerging economies, named after its members Brazil, Russia, India, China and South Africa. Despite the country's rapidly growing economy, poverty and social issues remain a challenge. The burgeoning population and accelerated urbanisation in the country have resulted in an environment at risk, and greenhouse gas emissions that continue to spiral upwards. GIZ, in close cooperation with Indian partners, offers tailor-made solutions to meet local needs and achieve sustainable and inclusive growth.

The key focal areas of Indo-German cooperation are currently

- energy
- the environment
- sustainable economic development.

Our main commissioning parties are the Federal Ministry for Economic Cooperation and Development (BMZ) and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). In addition, we work for Indian public sector clients, the European Union and foundations.

The Government of India has launched several initiatives to address the country's environmental and social challenges, and GIZ is contributing to some of the most significant. For example, it is supporting the National Urban Sanitation Policy as part of the Clean India Campaign (Swachh Bharat Abhiyaan) in partnership with the Ministry of Urban Development. GIZ is also constantly exploring how to contribute to further initiatives in India.

FOREWORD

The last decade has witnessed renewed focus on improving sanitation services for urban India as a necessary reaction to the unprecedented urbanization of Indian towns. Several initiatives of the Government of India and in particular, the Ministry of Urban Development (MoUD), have identified good quality water, sanitation and waste management services as a necessary foundation for reducing economic and social inequalities rampant in the urban Indian context.

The National Urban Sanitation Policy (NUSP) was introduced in 2008, which set out the important goals of making Indian cities and towns totally sanitized, healthy and liveable along with ensuring and sustaining good public health and environmental outcomes. The City Sanitation Plan (CSP) was introduced by the NUSP as a key planning tool and vision document for urban local bodies (ULBs) for achieving city-wide sanitation. The Swacch Bharat Mission (SBM) launched in 2014 reinforced the commitment of the State to improve the sanitation performance index of the country, it also reasserted the importance of CSP's as a planning tool and guiding document. And with the launch of Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart Cities in 2015, both aimed at improving living conditions in urban areas and targeted towards development in urban sector; it became imperative for a city to adapt proper planning processes so the projects and infrastructures built on ground can actually contribute to improving the conditions in the cities, thus can termed as successful.

To provide the necessary support to key national, state and local players for effective implementation of the NUSP and to ensure realization of its inherent goals, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH with Ministry of Urban Development (MoUD) started the project 'Support to the National Urban Sanitation Policy (SNUSP)' as part of Indo-German technical cooperation. Now the project is in its second phase, it started in the year 2011. The project aims to upscale the knowledge and approach for CSP preparation and make it available to more cities and states.

One main objective of the SNUSP II is to capacitate ULBs in collaboration with relevant state department for handling the challenges on the road to improved city sanitation. With this in mind GIZ in cooperation with Centre for Science and Environment (CSE) has developed an innovative and unique training and handholding programme on 'Preparation of City Sanitation Plans' for stakeholders to understand the added value of a CSP and Septage Management for sustainable urban development and enable city officials/ managers prepare and integrate the CSP as an important tool in their day to day work. This training program has been prepared based on the experiences of GIZ during the first phase of the project (2011-2014) in preparing CSPs for some cities as well as experiences from the training and handholding programmes for small and medium towns in selected partner states organized by GIZ-CSE.

This present "Introducing City Sanitation Plan: A Practitioners Manual" is a culmination of this long drawn process in introducing the importance of CSP for city development. It aims - to sensitize practitioners (key ULB level officials, decision makers, city engineers etc.) to the importance and significance of the CSP as a planning and guidance tool; to support them in understanding key concepts of the CSP preparation process in order to

help them gauge the sanitation situation of their city / town better; and to help disseminate knowledge on CSP to other cities and states.

This Manual is thus the first stepping stone of the training programme and is meant to actively assist them during actual implementation of the CSP. It covers a wide spectrum of topics including introduction to technical requirements of sanitation systems, explaining the relationship between CSP and other urban planning tools like Master Plan and City Development Plan, explaining legal frameworks, capacities, financial management and other aspects essential for successful CSP implementation. If read together with the "Introducing City Sanitation Plans – A TOT Manual", it will provide complete training guide thus allowing the practitioners to effectively pass on the knowledge they gain from this training program and sensitize other stakeholders from different cities and states.

I congratulate my team for developing an evidence based reader friendly document that will help stakeholders in improving knowledge about CSP and which will contribute to the larger goal of improving the sanitation sector at city level. This is another supporting step by SNUSP II towards making India healthy, hygienic and an environment friendly place liveable for all. I would also take the opportunity to express my sincere gratitude to our partners - Suchitwa Mission, Local Self Government Department, Government of Kerala, Commissioner & Director Municipal Administration, Government of Telangana and Commissioner & Director Municipal Administration, Government of Andhra Pradesh; for all the support they extended.

Dirk Walther
Project Director
Support to the National Urban Sanitation Policy II

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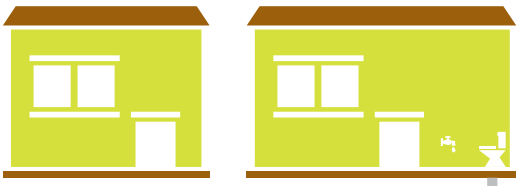
AP	Andhra Pradesh
CBO	Community-based Organisation
CBSE	Central Board of Secondary Education
CDP	City Development Plans
CoC	Corporation of Cochin
CSE	Centre for Science and Environment
CSP	City Sanitation Plan
CSTF/CTF	City Sanitation Task Force
cu.m	Cubic meters
DEWATS	Decentralized Waste Water Treatment System
DPR	Detailed Project Report
DUD	Department of Urban Development
ESF	Ecosanservices Foundation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German International Development Cooperation)
GoI	Government of India
HH	Household
HP	Himachal Pradesh
HfA-PoA	Housing for All - Plan of action
IGEP	Indo-German Environment Partnership Programme
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
MoHRD	Ministry of Human Resource Development
MoHUPA	Ministry of Housing and Urban Poverty Alleviation
MoUD	Ministry of Urban Development
NAPCC	National Action Plan on Climate Change
NGO	Non-Government Organisation
NMC	Nashik Municipal Corporation
NMSH	National Mission on Sustainable Habitat
NSSI	National School Sanitation Initiative
NUSP	National Urban Sanitation Policy
O&M	Operation & Maintenance
PoA	Plan of Action
RAY	Rajiv Awas Yojana
RMC	Raipur Municipal Corporation
SACH	Society for Action in Community Health
SDGs	Sustainable Development Goals
SLB	Service Level Benchmarking
SLSC	State Level Sanitation Committee
SNUSP	Support to the National Urban Sanitation Policy
SSS	State Sanitation Strategies
STP	Sewage Treatment Plants
SWM	Solid Waste Management
TAC	Technical Advisory Committee
ULB	Urban Local Bodies
UNICEF	United Nations Children's Fund
URIF	Urban Reform Incentive Fund
WHO	World Health Organization

INTRODUCTION

According to the Census of India 2011, 18.6% of households in urban areas do not have access to any toilets at home and are dependent on public latrine facilities or practice open defecation. Only about 32.7% of households are connected to a piped sewer network but even this wastewater is not always conveyed and treated adequately. Inadequate access to sanitation especially in urban slum settlements is one of the key impediments to the quality of life, public health outcomes and urban productivity. Further, the unsatisfactory performance of the sanitation sector imposes serious threats to the environment and around two thirds of all surface water bodies are contaminated through untreated waste water intakes.



18.6%
of households in urban areas do not have access to toilets at home

32.7%
households connected to a piped sewer but with in adequate wastewater treatment

Increasing urbanization and India's changing demographics amplify the challenges and require even more focus on improving sanitation infrastructure and services in Indian cities. The City Sanitation Plan (CSP) was introduced by the National Urban Sanitation Policy (NUSP) as the key planning tool and vision document for Urban Local Bodies (ULBs) for achieving city-wide sanitation.

In 2014, Government of India has reinforced its commitment to improve the sanitation situation by launching the Swachh Bharat Mission (SBM) with MoUD in the responsibility to implement this mission in urban areas. SBM guidelines include the planning tools from NUSP and the importance of CSP as planning tool and guiding document to identify investment projects has been confirmed.

For achieving the goals of NUSP, GIZ and Ministry of Urban Development, GoI joined hands in 2011 and started the technical cooperation project 'Support to the National Urban Sanitation Policy (SNUSP)'. Under this project GIZ provided support at national, state and city level to improve the implementation of the NUSP, ensure its sustainability and to help to build the capacities of the ULBs. Among other activities, 5 pilot cities (Shimla, Raipur, Tirupati, Varanasi and Kochi) prepared together with GIZ their CSPs and took the first steps of implementation with selected projects on the ground.

In 2014 the follow-on project 'Support to the National Urban Sanitation Policy (SNUSP II)' MoUD asked GIZ to upscale the knowledge and approach for CSP preparation and make it available to more cities and states.

In 2015, the Government of India launched the 50,000 crore Atal Mission for Rejuvenation and Urban Transformation (AMRUT) for FY 2015-16 to FY 2019-20, for an estimated 500 cities across the country. It is set to cover capacity building, reform implementation, water supply, sewerage and septage management, storm water drainage, urban transport and development of green spaces and parks. During the process of planning, the ULBs will strive to include some smart features in the physical infrastructure components. The mission aims at the following -

(i) ensure that every household has access to a tap with assured supply of water and a sewerage connection;

(ii) increase the amenity value of cities by developing greenery and well maintained open spaces (e.g. parks); and

(iii) reduce pollution by switching to public transport or constructing facilities for non-motorized transport (e.g. walking and cycling).

ABOUT THE MANUAL

CSP development is challenging. It needs involvement of various agencies and experts of the ULB in areas such as urban planning, sanitation, technical infrastructure and financing. Improvements in the sanitation sector concern every urban citizen and, therefore, require a participatory approach. For implementing a CSP, capital investments, adjustments of by-laws, strengthened administrative structures and adequate expertise might be necessary.

Under SNUSP II one main objective is to capacitate Urban Local Bodies in collaboration with relevant state departments to handle these challenges and prepare and implement CSPs. For this a training and handholding programme for small and medium towns in selected partner states was designed in cooperation with Centre for Science and Environment (CSE). The aim of the training programme is to upscale a structured and systematic approach towards preparation and implementation of CSP.

The first step of the training programme is sensitization on the relevance of CSP for sanitation planning in Urban Local Bodies in India. Against this backdrop the Manual was designed as 'CSP Sensitization Training Manual' in collaboration with Ecosan Foundation (ESF) and CSE. The manual is a support document for participants of the Training and Handholding programme. It also aims at disseminating knowledge on CSP preparation and implementation to other cities, towns and states

As a Sensitization Manual, it provides an overview on the relevance and contents of a CSP, gives an introduction to technical requirements of sanitation systems and explains to the reader what is required for successful implementation of a city sanitation plan beyond technical solutions (e.g. legal framework, capacities, financial management etc.). The content of the manual will help ULBs and state departments to understand why every city and town needs to have a CSP to improve their sanitation situation on the ground.

STRUCTURE OF THE MANUAL

The present manual is designed in line with the first training module of the Training and Handholding Programme for CSP Preparation and Implementation. The Power Point Presentations of this first training module are available together with the manual on a CD that is attached to this manual.

The Manual consists of 6 chapters covering on the one hand the City Sanitation Plan, its contents and requirements for implementation and on the other hand relevant technical content for understanding sanitation systems in a city in a better way.

The manual starts with introducing the concept of City Sanitation Plans, its relevance and its importance in improving health and hygiene of the city. It presents the current sanitation scenario across Indian cities and the main challenges. It explains the policy framework, in which the CSP emerged as a planning tool to address exactly these challenges and showcases the initiatives taken by MoUD to improve the sanitation sector and facilitate implementation of projects on the ground.

The CSP should not be seen as a stand-alone planning document. To achieve improvements in the city, it needs to be in tune with the overall urban planning. The second module explains the relationship between CSP and other urban planning tools like Master Plan and City Development Plan (CDP). It shows the interrelations between sanitation and sanitation-related sectors, such as urban infrastructure and livelihood generation.

A CSP needs to create a strategy for the whole sanitation system of a city. Therefore the third module explains the different types and components of urban sanitation systems with a special focus on wastewater and septage management. Since the majority of small and medium towns in India are relying on on-site

sanitation systems and septic tanks, this chapter goes into further detail on how to handle septage safely and develop a comprehensive septage management system.

A plan is only as good as its implementation so the fourth module of the manual presents the main steps for translating CSP into action. One key for a successful implementation is to have all relevant stakeholders and the community on board and the manual explains why stakeholder participation is important as well as how this can be organised for the preparation and implementation of the CSP.

A functioning sanitation system doesn't depend on technical options alone. The right social, financial and legal conditions have to be in place. In the fifth module the main so-called supporting factors that lead to a successful implementation of CSP are listed and explained: legislative framework, institutional set-up, capacities and finances. This chapter explains what falls under each dimension and in which way it is relevant for CSP and a functioning sanitation system.

The framework condition of a city keeps changing; these changing elements influence any planning that is done for the city. Thus, a CSP has to respond to all these changes through revision at regular intervals for it to be a relevant and a 'living' document. Module six of the manual explains the main growth and change factors for cities and explains how the CSP can be made responsive to dynamic developments.

These six modules should finally help the reader to achieve an understanding of why time, energy and resources of a city should be invested in preparing a CSP and how such a planning document could actually improve the sanitation sector in Indian cities and towns. The manual aims at raising awareness for a broader perspective on sanitation including various technical sectors, such as sewerage, septage management, solid waste management, access to toilets, storm water management and water supply and non-technical requirements

MODULE 01

RELEVANCE AND ADDED VALUES OF A CSP

LEARNING OBJECTIVES

- To understand the impacts of inadequate sanitation and sanitation challenges faced by Indian cities today;
- To get an overview of the initiatives taken by the Government of India for improving sanitation service delivery in urban areas;
- To understand various elements of the National Urban Sanitation Policy and their importance in achieving 100% access to sanitation for all at the national, state and city level.

Water and sanitation are indispensable for quality of life and are known to determine the overall development of any nation. The Millennium Development Goal (MDG)[1] targeted to halve the population without sustainable access to safe drinking water and basic sanitation by 2015. The successive goals, the Sustainable Development Goals (SDGs)[2] take even one step further and focus on the improvement of the complete sanitation chain. India still has a lot to achieve, especially on the sanitation front. Though sanitation services are a major concern for maintaining good urban environment, especially in marginalized urban settlements, not much impact has been achieved towards improved sanitation. This Module begins with describing the impacts of inadequate sanitation on human health, environment, gender and economy and provides a better understanding of sanitation and its components. It describes the major challenges of urban sanitation in India and introduces governmental programmes aiming to tackle these sanitation challenges including the Swachh Bharat Mission and AMRUT (2014). Further it briefly describes the National Urban Sanitation Policy (NUSP - 2008) and its various planning and implementation tools such as City Sanitation Plans and State Sanitation Strategy.

1 In September 2000, world leaders came together in New York to adopt the United Nations Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets – with a deadline of 2015 – that have become known as the Millennium Development Goals (MDGs).

2 At the United Nations Sustainable Development Summit on 25 September 2015, world leaders adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 Sustainable Development Goals (SDGs) to end poverty, fight inequality and injustice, and tackle climate change by 2030. The SDGs, otherwise known as the Global Goals, and the broader sustainability agenda, go much further than the MDGs, addressing the root causes of poverty and the universal need for development that works for all people

I WHAT IS SANITATION?

Sanitation is defined as safe management of human excreta including its safe confinement, collection, treatment, disposal and associated hygiene-related practices.

It is also realized that integral sanitation solutions need to take into account other elements such as solid waste management, storm water management, drinking water supply etc.

Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Thus it becomes imperative, to first analyze the impacts of inadequate sanitation to understand better the scale and magnitude of actions required to take the first steps in the right direction.

II IMPACTS OF INADEQUATE SANITATION

Inadequate sanitation is much more than just an inconvenience - it costs lives, dignity and productivity. Poor sanitation has a direct influence on increasing mortality rates of children[3] and on the number of girls dropping out of school. It limits the number of opportunities especially for women and urban poor and increases their vulnerability. Lack of adequate sanitation is thus not only a symptom of poverty but a major contributing factor. Its lack is related to, and aggravates, other burdens of inequality experienced by the urban poor. The lack of sanitation increases living costs, decreases money spent on education and nutrition, lowers income earning potential, and threatens safety and welfare. Presented below is a summary of the crucial impacts inadequate sanitation has on certain areas of society:

Examples of impacts of inadequate sanitation in India		
	Economy	• More than 2 billion of human hours lost annually • Economic costs related to health care expenses were INR 21, 200 crore in the year 2006 • Productivity loss due to health problems caused by inadequate sanitation = INR 217 billion/year • Reduced value of properties • Reduced income from tourism
	Gender	• Women & girls face drudgery & serious health disorders – due to lack and dirtiness of toilets, lack of privacy, long waiting time • Girls miss out school, discontinue their schooling • High rate of crimes and violence against women when they are out for open defecation
	Health	• Roughly 2.2 million people die / year due to sanitation related ailments • Globally, close to 1800 children below 5 years die every day due to lack of water and sanitation facilities • 24% of total deaths of children below 5yrs in India
	Environment	• Contamination of the environment (soils, ground water, water bodies) • Reduced ecosystem services • Reduced scenic beauty

3 Unicef Press release - http://www.unicef.org/media/media_68359.html (Accessed: 10-3-15)

Globally, 2.5 billion people lack access to improved sanitation and 1.1 billion still practice open defecation. Of these, 597 million people alone reside in India[4], making it a key sanitation concern in the country. It is estimated that India is going to fall way short of meeting the Millennium Developmental Goals target for sanitation in 2015, with up to 40 % of urban Indians still lacking improved access to sanitation

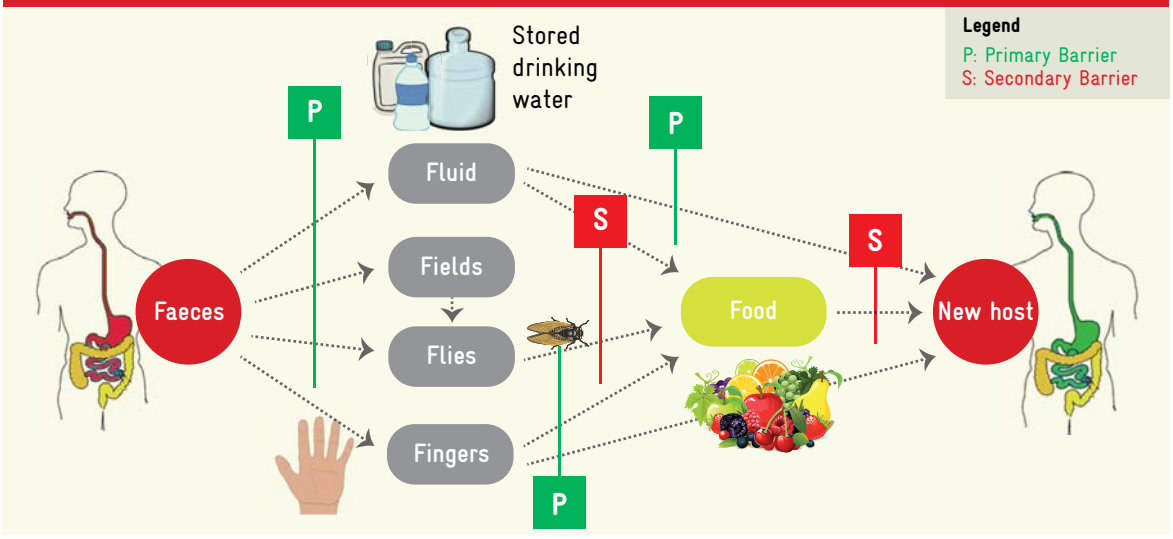
The problems are not restricted to merely access to toilets. As per a report by Myles Elledge and Marcella McCatchey[5], where sanitation access is available, many urban residents use toilets that are not connected to any further system for treatment of black water generated by these toilets Therefore, only providing access to toilets does not solve the sanitation problem. Sewerage Treatment Plants in India only have the capacity to treat 37% of the 62000 MLD generated wastewater in cities. This limited capacity is still underutilized and only 30% of the wastewater is actually treated there[6]. Even when there are sewerage networks, much of the waste fails to reach wastewater treatment plants due to improper household connectivity to sewerage networks, among other reasons.

These issues affect various parameters on which growth of the society is measured. Some of these have been elaborated below statistically:

SANITATION AND HEALTH

- According to UN-Water 2012 report, globally, 34% reduction in mortality can be achieved through improved sanitation which could be doubled when coupled with hand-washing with soap[7]
- Models indicate that over 20% of global mortality and disease burden of children between the age of 0-14 years is due to unsafe water and sanitation practices. In fact, according to the UNICEF, water-borne diseases such as diarrhea and respiratory infections are the number one cause for child deaths in India with up to 1000 deaths per day of children below the age of five occurring in the country[8].
- In India, poor sanitation severely impairs health leading to high rates of malnutrition and productivity losses. About 48 per cent of children in India are suffering from some degree of malnutrition and a large part of this malnutrition burden is owing to the unhygienic environment and poor sanitation in which children grow up (refer to Fig: 1 below).

Fig. 1 | F-diagram – Linking sanitation and health



4 WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (2014 update)

5 Myles Elledge and Marcella McCatchey – "India, Urban Sanitation and Toilet Challenge"; RTI Research Brief, September 2013

6 Inventorization of Sewage Treatment Plants (STPs), CPCB, CUPS Series, March 2015

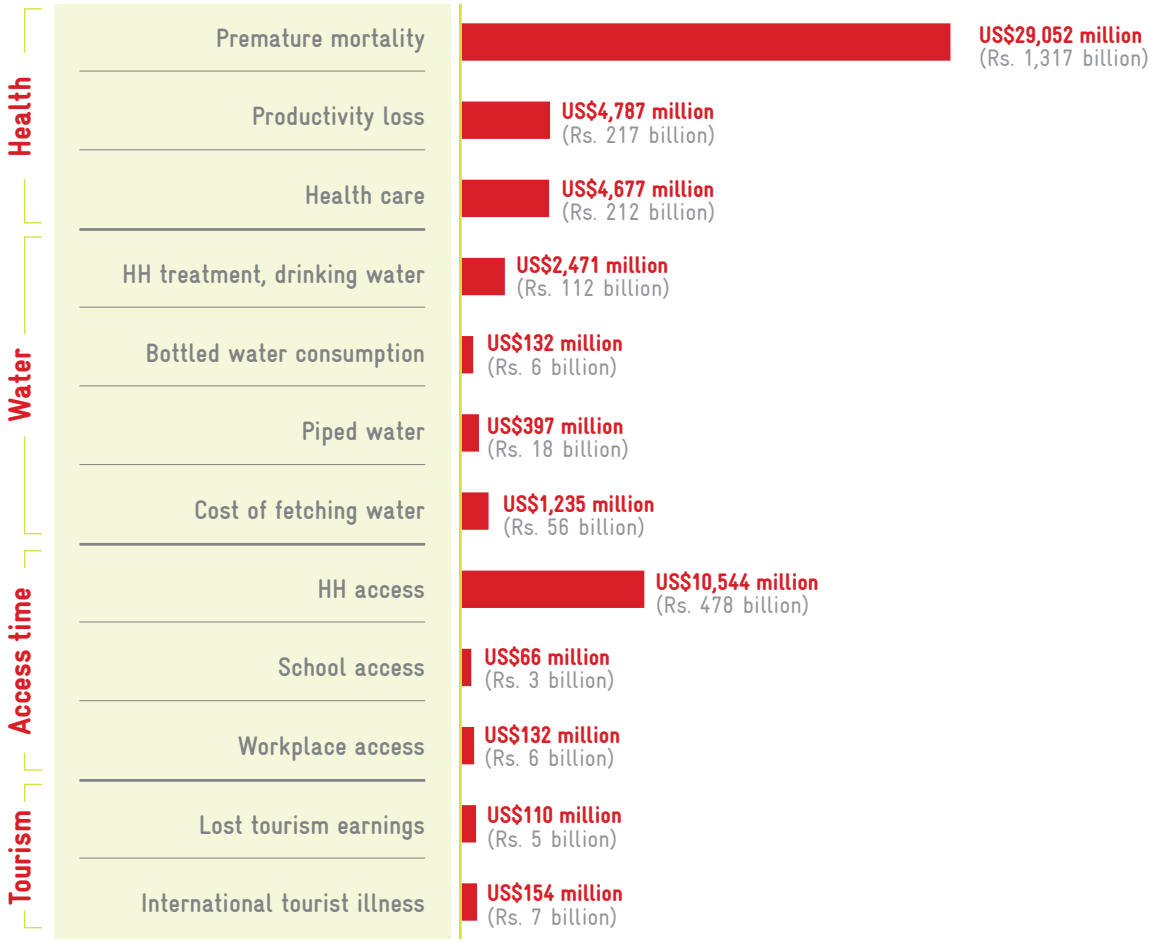
7 Sustainable Sanitation: the five year drive to 2015 (Factsheet 2); Original Source - WHO, UNICEF, LSHTM

8 India Facts and Statistics; World Vision India - Child Health Now http://www.indiaprwire.com/downloads/document/201008/15355.pdf (Accessed: 10-3-15);

SANITATION AND ECONOMY

- The United Nations Developmental Report of 2006 noted that "On average, every US dollar invested in water and sanitation provides an economic return of eight US dollars"[9]. The economic losses suffered by the entire world due to lack of sanitation and water services is staggering. More than a decade ago, the WHO in 2002 estimated the economic loses worldwide by deaths caused due to sanitation to be USD 3.6 billion a year i.e. the world could have potentially earned USD 3.6 billion per year if these deaths could have been stopped.
- India lost as much as 6.4% of its GDP due to inadequate sanitation back in 2006. These costs include those associated with death and disease, accessing and treating water, and losses in education, productivity, time, and tourism.
- According to the Indian Ministry of Health and Family Welfare, more than 12 billion INR is spent every year on poor sanitation and its resulting illnesses.

Fig. 2 | Economic impacts of inadequate sanitation in India by categories[10]



These are not mere statistics, they represent real lives of individuals which are adversely affected, and hence greater focus to effective planning and management of sanitation services is necessary.

9 Source: http://clearflo.in/water-facts-economic.html (accessed on 10.05.15)

10 *The Economic Impacts of Inadequate Sanitation in India, WSP* (2010)

SANITATION AND GENDER

Gender does not simply refer to women or men, but to the way their qualities, behaviours, and identities are determined through the process of socialization. Thus it was estimated that in Africa 90% of the work of fetching water is done by women[11]. Also women and girls have health disorders – due to lack of and unclean toilets, lack of privacy, long waiting time. Many girls also drop out of school due to absence of sanitation facilities. Unless we understand gender roles and its impact on water and sanitation services, bridging the inequalities is a difficult task (More information in Module 2).

SANITATION AND ENVIRONMENT

Out of the 1.2 billion inhabitants in India, more than a 100 million lack safe drinking water and the number of people without access to any sanitation services is many-fold more. Poor sanitation management coupled to open defecation have allowed for an overwhelmingly unhygienic environment and a variety of widespread health problems. This includes contamination of natural water bodies including ground water, loss of soil fertility, adverse impacts on ecosystems, reduced scenic beauty etc. (More information in Module 2 and Module 3).

DID YOU KNOW

REPORT
HINDUSTAN TIMES, DECEMBER 21, 2010

A UN study of 2010 showed that more people in India have access to mobile phones than to proper sanitation facilities. Now comes a World Bank study that has quantified the cost to the country due to poor sanitation.

The study 'Economic Impact of Inadequate Sanitation in India', conducted by World Bank's South Asia Water and Sanitation Unit, says lack of toilets and decent sanitation costs India nearly USD 54 billion (Rs 24,000 crore), or 6.4% of its GDP per year, mainly through premature deaths, especially of children, treatment for hygiene-related illnesses, and lost productivity.

Lack of proper sanitation creates major health risks, raising the threat of potentially fatal illnesses such as typhoid and malaria.

India's situation is worse than many other Asian countries. The annual per person losses from poor sanitation is USD 9.3 in Vietnam, USD 16.8 in the Philippines, USD 28.6 in Indonesia, and USD 32.4 in Cambodia. But in India it is USD 48 on a per capita basis, showing the urgency with which India needs to improve sanitation.

11 UN-WATER factsheet (2013) – Water and Gender; http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/water_and_gender.pdf (Accessed on 23.05.15)

III URBAN WATER MANAGEMENT

URBAN WASTE WATER STREAMS

For understanding negative impacts of inadequate sanitation, first key elements of sanitation causing those impacts must be explained. Urban wastewater is a mix of domestic as well as industrial wastewater. Domestic wastewater comprises of different streams / types of wastewater. These have different characteristics based on their source:

Fig. 3 | Types of water streams to be managed in urban areas

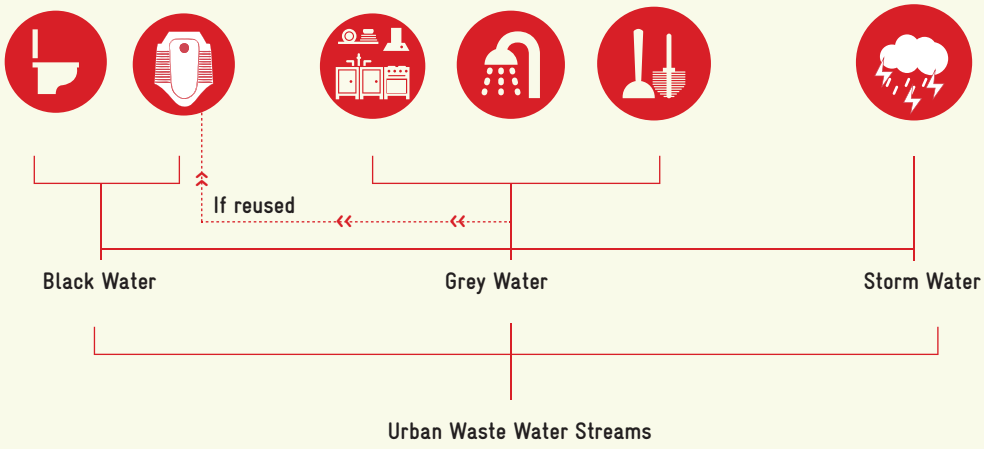
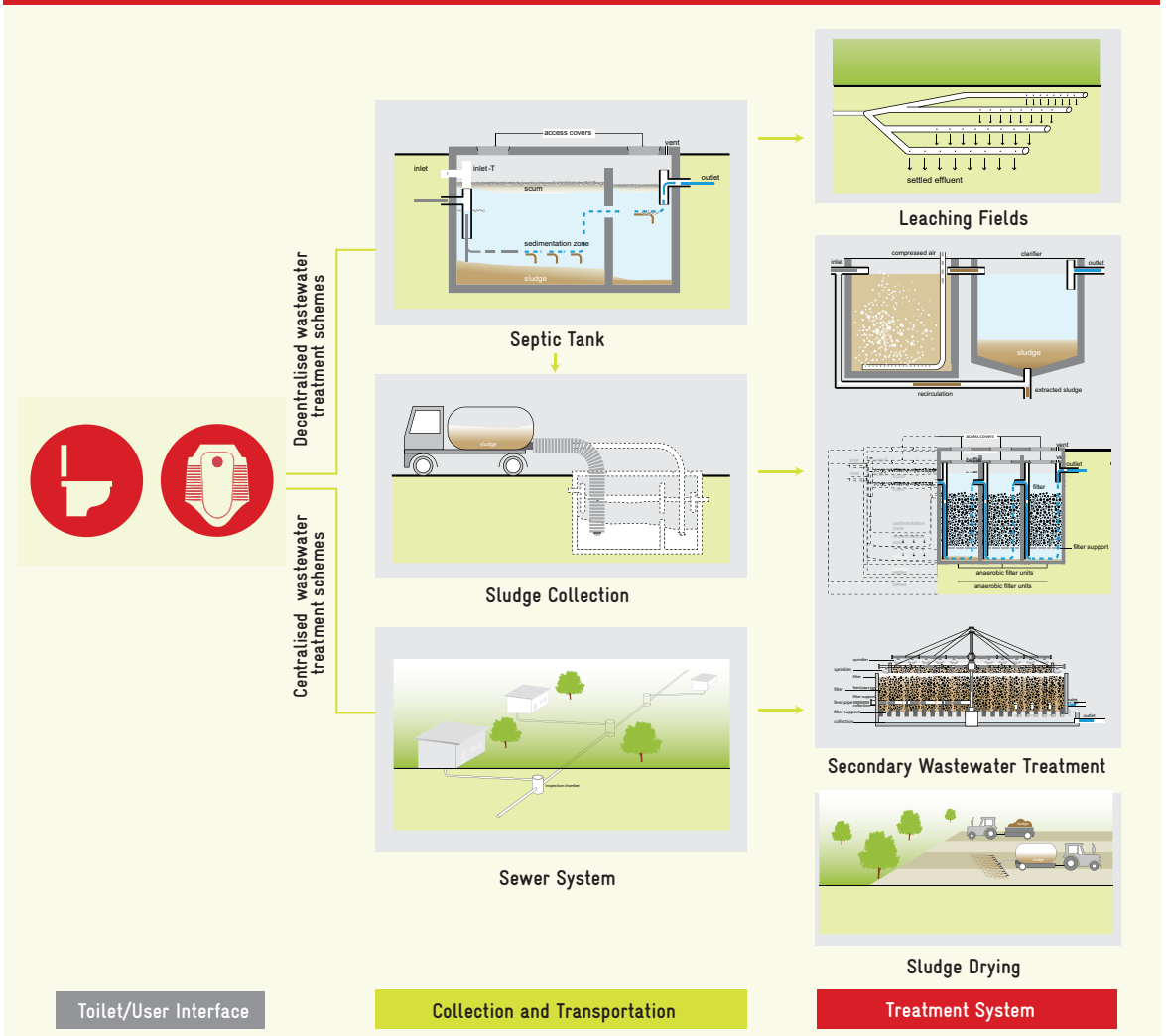


Table 1: Urban Waste Water streams	
Black Water	Water coming from toilets including fecal matter and urine is called as **black water**. This is the stream of wastewater with the highest risk for public health if not treated adequately as it contains a high number of pathogens introduced by fecal matter. This stream has high organic load and needs the maximum amount of treatment. If treated efficiently it can be used for generating compost and biogas
Grey Water	Water from bathing, hand washing, kitchen and laundry is called **grey water**. It does not contain toilet water, has comparatively low organic load & pathogen content, thereby needing considerably less treatment. It is the largest in volume among the domestic wastewater streams (70 – 80%). Grey water can be reused for gardening, irrigation and other non-potable uses (toilet flushing, construction etc.) after adequate treatment as per standards.
Storm Water	**Storm water** is generated as a result of rain water run-off which can carry pollutants such as oil, chemicals, septic tank overflows and organic pollutants etc. which are washed off from surfaces. The volume of storm water depends on the climatic conditions of the area and it is usually advised to keep separate storm water drainages. Flow control mechanisms can be introduced in areas with high rainfall to avoid urban flooding.

The ideal way of dealing with these different streams is separating them at source and providing treatment as per required standards. This approach not only makes handling of wastewater more efficient and cost effective, but also allows recovery of materials for reuse.

URBAN SANITATION SCHEME

Fig. 4 | Components of the urban sanitation scheme



Urban Sanitation systems comprise of generation, collection, transportation, disposal / reuse of treated wastewater streams. Sanitation systems using appropriate technologies enable recycle and reuse of treated waste water thus reducing burden on freshwater resources. All this can be achieved by implementation of well planned sanitation schemes in cities as shown in the Figure 4 above. The figure describes three main parts of any sanitation scheme –

User Interface

The toilet is the user interface of the sanitation system. The design, location, construction and maintenance of toilets needs to take into consideration space availability, different requirements of user groups (men, women, children, disabled), access to the facility (especially important for operation and maintenance) and investment costs.

Collection and Transportation

The collection and transportation of fecal sludge or wastewater is greatly dependant on the type of toilet, which in turn has numerous variables. For instance, toilets in high income localities would be different from those in middle income localities and perhaps even more so as compared to low income localities, where the prevalence of pit-latrines, community toilet blocks, pour-flush toilets etc. is expectedly higher. The toilet determines what type of wastewater and what volume of wastewater will be transported. For example, if water saving toilets are used, then the volume of wastewater generated would be less as compared to

conventional systems. For transportation systems, it is also important to consider future expansion of the system which would be required as the urban population grows. Some of the common collection options are described below:

On-site

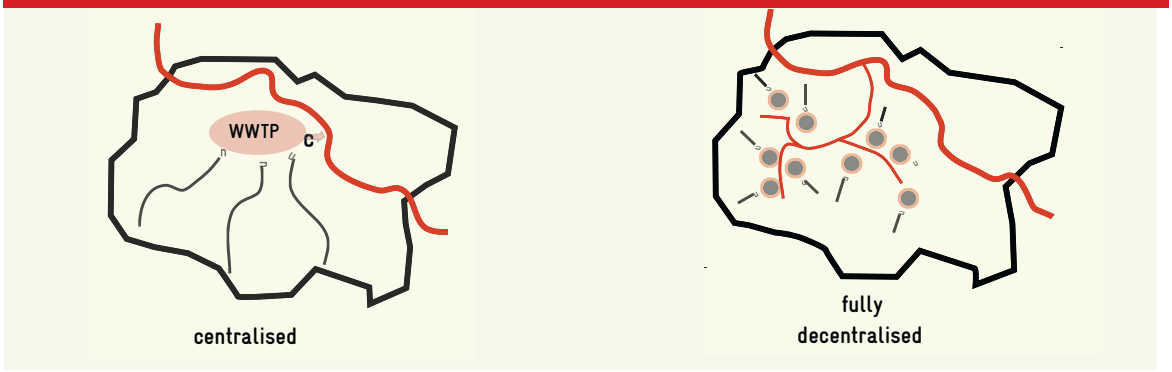
- Septic tanks are very common in urban India, however, they need to be maintained and regular desludging is required. Sludge may be collected by trucks with vacuum pumps and transported to the treatment facility. The lack of such treatment facilities and poor construction and maintenance of the septic tanks are reasons for this system to fail.
- Soak pits are generally used to collect overflow from septic tanks and grey water and can cause groundwater contamination especially in areas with a shallow water table.

Off-site

- Wastewater from almost 1/3rd urban households in India is transported through a network of sewers. These sewers would ideally lead to the treatment facility. Sewers also need to be properly maintained to ensure that there is no blockage. Sewer leakages need to be avoided to prevent leaching and ground water contamination.

Treatment System

Fig. 5 | Different models of treatment systems



Source: Sanitation – 21 (GIZ, 2014); Original source - Starkl et al., 2012

With technological advancement many options for the treatment of waste water and fecal sludge are available. The systems may be decentralized or centralized. Though centralized systems are planned off site, the decentralized systems may be planned on site or off-site, depending on the site conditions and acceptance of stakeholders (More details are described in the Module 3 – Urban Sanitation Systems).

- The selection of treatment system depends on the available quantity of water supplied, type of collection and transportation system, potential reuse and recycling options, space availability, technological capacity of the operation staff, and availability of funds.
- With adequate treatment, wastewater can be effectively reused for non-potable purposes like gardening, irrigation, car washing etc.

IV SANITATION SCENARIO ACROSS INDIAN CITIES

A study by researchers at the Sanitation initiative of the Centre for Policy Research, New Delhi[12] *notes As India urbanizes, demand for effective and sustainable sanitation services will increase [...] While access to toilets remains a big issue, improving sanitation services in urban areas requires an integrated approach that includes treatment and disposal of human waste. This integrated infrastructure is particularly lacking in smaller cities. According to a report published in 2009 by the Central Pollution Control Board (CPCB) on wastewater*

12 India: Big push for small cities - Prakhar Jain and Aditya Bhol, 2014; https://sanitationupdates.wordpress.com/2014/08/04/india-big-push-for-small-cities/ (Accessed: 10-3-15)

Source: ESF (2009)

treatment in India" (see Table 2 below), *"large cities have about 51% of required wastewater treatment capacity as compared to only 17% in small cities...which… pollutes the environment, particularly drinking water sources such as lakes and rivers, resulting in health hazards".*

Table 2: Different models of treatment systems

Wastewater generation and treatment capacities across Indian Cities			
Category of cities	Sewage Generation (MLD)	Sewage treatment Capacity (MLD)	% of Design Treatment Capacity
Metro Cities (35)	15,644	8,040	51%
Class I cities (495)	35,558	11,553	32%
Class II cities	2,697	234	8%

Source: CPCB, 2009

The above mentioned report highlights the severe sanitation challenges faced by Indian cities and some of them are enlisted below:

Lack of sewerage connection

Sewerage network prevalence is considerably poor. 38.2% of urban households depend on septic tanks as systems for wastewater management and only 32.7% urban households are connected to a piped sewer system [13]. Also public and community toilets often lack water supply and in other cases, their waste water outlets are not connected to the city's sewerage system. This fact is especially relevant for the urban poor and marginalized population since their dependence on such community and public toilets is high. Many on-site sanitation systems are in a dismal state and this effectively means that a large quantity of urban waste water is let off unsafe into surface storm water drains or seeps into the ground polluting groundwater.

Lack of toilets and open defecation

According to Census data from 2011, 12% of the urban Indian population defecates in the open. When combined with congestion and high-density that defines urban areas, this makes it hazardous with respect

13 Census 2011: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf (Accessed: 10-3-15)

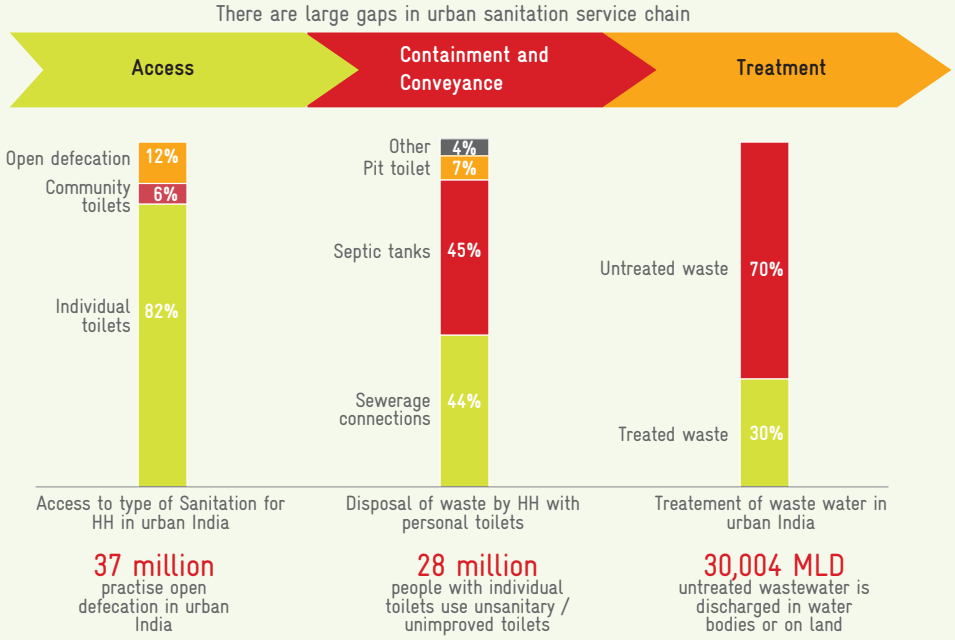
to environmental and health implications especially for the poor and marginalized who don't have access to improved water sources. The issue of persistent open defecation also highlights the necessity of awareness raising and behavioural change of urban citizens for improving the sanitation situation in Indian cities.

Lack of waste water treatment

With rapid population expansion of cities and domestic water supply, quantity of wastewater is increasing in the same proportion since 70-80% of total water supplied for domestic use is generated as wastewater. However waste water treatment capacity of the city has not increased in proportion and continues to be inadequate. This untreated waste water ends up contaminating fresh water sources leading to unsanitary and unhygienic living conditions, further endangering lives.

The following Fig. 6 presents a summary of the issues faced by urban India through the entire sanitation service chain:

Fig. 6 | Status of Sanitation Infrastructure in India



Sources: GIZ (2015, unpublished) – Original source: Census, 2011, NSSO 69th Round, 2012 and CPCB, 2009

The main reasons for the above identified challenges are:

- **Absence / Inadequacy of infrastructure** – The sanitation infrastructure in cities is not adequate for the current population and even less for the projected population growth in upcoming years. If infrastructure exists, it is often inadequate for the requirements, e.g. treatment capacity is too low, building rules are not followed, pumping states are not functional.
- **Mismanagement of services** – Although infrastructure is available, constraints of human resource, absence of technical and managerial skills, overlapping roles with different institutions and lack of sustainable financial models are key causes for mismanagement of sanitation services leading to sub-optimal outcomes in the sanitation sector.
- **Lack of coordination and planning** – Multiple institutions are involved in planning and implementation of sanitation services. Roles and responsibilities are often not clearly defined and therefore accountability is not ensured. There is a lack of inter departmental coordination and concerned stakeholders are not sufficiently involved in planning processes.

- **Misuse of services** – Even if sanitation services are provided, proper usage cannot be always be ensured. Storm water drains are being used for waste water transportation, solid waste is dumped in storm water drains resulting in clogged drains or public toilets are misused. It requires ownership and awareness of not only technical staff but also of the community for avoiding such malpractices. Bringing stakeholders of different sectors of the society on board from the beginning of planning and implementation of the sanitation services is one of the main tools to ensure proper usage.

V URBAN SANITATION INITIATIVES

The Government of India has taken several initiatives over the past decades to tackle afore mentioned challenges in sanitation service delivery which include a range of measures such as legal and policy framework, funding programme, subsidies, capacity building and dedicated schemes to improve access.

In the recent past, some landmark policies have been drafted and sanitation programs have been launched by the Centre and the States in pursuit of the emerging challenges. Presented below in Fig. 7 is an analysis of the some important past policies and schemes of the Government which have helped shape our sanitation vision as it stands today:

Fig. 7 | Urban Indian Sanitation Programs and Schemes: Covering a wide spectrum

Integrated Development of Small and Medium Towns Scheme (IDSMT)	Integrated Low Cost Scheme (ILCS)	State specific sanitation	Jawaharlal Nehru National Urban Renewal Mission (JNNURM)
Centrally sponsored – started in 1979. Population of towns and cities selected were – 20,000 to 5,00,000 people **OBJECTIVE** Enable small and medium towns to generate income and employment and arrest migration. Components included those under CDP / Master plan, Later integrated with JNNURM to include sewage management, water supply, sanitation. **OUTCOME** - 1854 towns funded approximately Rs.1070.00 cr. - Succeeded in creating assets for Urban Local Bodies (shopping centers, sites and services scheme, parks and playgrounds, roads, bus stands, street lighting, storm water drainage network etc).	Centrally sponsored – started in 1980 -81 to liberate manual scavengers **OBJECTIVE** Construct low cost sanitation 2-pit pour flush latrines with superstructure especially for economically weaker sections **OUTCOME** About 2.3 million service latrines (of the 5.4 million reported by NSS, 1989) were converted into sanitary ones by July 2007, and more than 50,000 scavenging workers rehabilitated	Rajasthan (2009); Bihar State Water & Sanitation Policy; Andhra Pradesh Water, Land & Tree Act; etc **EXAMPLE STATE-LEVEL** Karnataka State Water and Sanitation Policy – Ensure universal coverage of water and sanitation services that people want and are willing to pay. **EXAMPLE LOCAL GOVT. INITIATIVES** Municipal Corporation of Greater Mumbai (MCGM) – World Bank assisted Slum Sanitation Programme under Mumbai Sewage Disposal Project: 1996-2005.	Flagship mission (2005 – 2014), approx. 20 billion US $, responsible for most of the development work since 2005 – massive fund translocation to urban **OBJECTIVE** Transform 63 cities; 2 sub missions 1) Urban Infrastructure and Governance; 2) Basic Services to the urban poor **OUTCOME** Roughly 70% of fund disbursed for water supply, sewerage, storm water drainage, solid waste management etc.

VI 'SWACHH BHARAT MISSION' AND ON-GOING URBAN MISSIONS

SWACHH BHARAT MISSION

The Prime Minister of India launched the 'Swachh Bharat Mission' on 2nd October 2014. This umbrella campaign aims to accomplish the vision of 'Clean India' including Open Defecation Free India by 2 October 2019, 150th birthday of Mahatma Gandhi and is expected to cost over INR 62000 crore (USD 9.7 billion). Swachh Bharat Mission (SBM) Urban has been launched by the Ministry of Urban Development to be made applicable to all 4000 + statutory towns and cities in the country. The specific objectives of the urban Swachh Bharat Mission include:[14]

Table 3: Specific Objectives of Swachh Bharat Mission	
i	Eliminate open defecation
ii	Conversion of insanitary toilets to pour flush toilets,
iii	Eradication of manual scavenging
iv	100% collection and scientific processing/disposal reuse/recycle of Municipal Solid Waste
v	To bring about a behavioural change in people regarding healthy sanitation practices
vi	Generate awareness among the citizens about sanitation and its linkages with public health
vii	Strengthening of Urban Local Bodies to design, execute and operate systems
viii	To create enabling environment for private sector participation in Capital Expenditure and Operation & Maintenance (O&M) costs

Source: SBM Guidelines, GoI

The Mission has the following components:

Household toilets, including conversion of insanitary latrines into pour-flush latrines with specific targets –

a) No households engage in the practice of open defecation,

b) No new insanitary toilets are constructed during the mission period and

c) Insanitary latrines are converted to sanitary latrines.

Community toilets

Construction of community toilets is targeted at households, which currently practice open defecation and cannot build individual toilets due to space constraints.

Public toilets

A specific number of public toilets with adequate provisions for men, women, children, disabled to account for all the floating population are constructed in each city.

Solid Waste Management

ULBs prepare bankable Detailed Project Reports with viable financial models for Solid Waste Management of their city in consultation with the respective state governments

14 Adapted from Swacch Bharat Mission (Urban); MoUD (2014)

IEC & Public Awareness

A key strategy under SBM (Urban) is behaviour change communication to ensure that sanitation as an issue is mainstreamed with the general public at large and should cover issues of open defecation, prevention of manual scavenging, hygiene practices, proper use and maintenance of toilet facilities (household, community or otherwise), and its related health and environmental consequences.

Capacity building and Administrative & Office Expenses (A&OE).

States shall propose extensive capacity building activities to be implemented in a mission-mode manner, which will enable the progressive achievement of objectives of SBM (Urban) in a time-bound manner. These will be specified in the comprehensive annual action plan prepared by each state. This will be approved by State Level High Power Committee after sharing and considering suggestions from MoUD.

Swachh Bharat Mission has included the planning tools of NUSP, namely the City Sanitation Plan and the State Sanitation Strategy, in its implementation mechanism. States are required to formulate and submit a concept note of its state sanitation strategy to receive the instalments for the activities under SBM. All investment projects submitted under SBM must furthermore be based on the City Sanitation Plan. Therefore all ULBs are requested to draft a CSP before going for Detailed Project Reports.

OTHER MISSIONS FOR URBAN DEVELOPMENT IN INDIA

Additional to Swachh Bharat Mission, the Ministry of Urban Development and Ministry for Housing and Urban Poverty Alleviation (MoHUPA) has launched following mission, which are relevant to the sanitation sector.

- Atal Mission for Rejuvenation and Urban Transformation (AMRUT) is aiming at improving urban infrastructure and supporting reform processes at ULB level. Improvements for Water Supply, Wastewater Management including sewerage as well as septage management and storm water management are forming part of this mission targeting 500 cities.
- The urban flagship programme of GoI is the Smart Cities Mission targeting 100 cities and aiming at fostering the role of cities as engines of growth, with a focus on developing sound institutional, physical and social infrastructure. The key aspect of SCM is to combine the needed infrastructure with smart technologies which ultimately improve integration and efficiency as well as the quality of service delivery including in the field of water and sanitation.
- Additionaly 12 heritages cities fall under National Heritage Development and Augmentation Yojana (HRIDAY). This scheme promotes an integrated, inclusive and sustainable development of selected heritage cities, expanding over the entire ecosystem including citizen, tourists and businesses.

VII NATIONAL URBAN SANITATION POLICY

Urban Sanitation was made a priority of the Government of India even prior to the start of the above mentioned missions. In 2008 the National Urban Sanitation Policy was launched aiming at creating sanitized, healthy and livable cities.

It laid out a vision for urban sanitation in India in a comprehensive and detailed manner. It introduced the relevant sanitation planning tools at state level with

NUSP Vision

VISION

All Indian cities and towns become totally sanitized, healthy and livable; and ensure and sustain good public health and environmental outcomes for all their citizens with a special foacus on hygienic and affordable sanitation facilities for the urban poor and women.

the State Sanitation Strategy and at ULB level with the City Sanitation Plan, which are taken forward by SBM.

Funding options are laid out including direct central and state support through existing schemes, public-private partnerships, and external funding agencies. It directed that at least 20% of the funds should be earmarked towards servicing the urban poor.

The National Urban Sanitation Policy envisaged transforming all towns and cities of India into 100% sanitised, healthy and liveable spaces — ensuring sustained public health and improved environmental outcomes for all its citizens. The policy focuses on achievements of outcomes rather than on mere construction of infrastructure, and emphasizes capacity building at city level.

The NUSP recognized that the following key policy issues enlisted in Fig. 8 must be addressed to achieve the vision:

Fig. 8 : NUSP – Key policy issues

KEY POLICY ISSUES			
	POOR AWARENESS – sanitation as least priority	**SOCIAL AND OCCUPATIONAL** aspects of sanitation	**FRAGMENTED INSTITUTIONAL** roles and responsibilities
	LACK OF INTEGRATED city-wide approach	**LIMITED** technology choice	**REACHING** the un-served and poor

To address the key issues identified above the National Urban Sanitation Policy formulated the following goals:

A. **Awareness Generation & Behaviour Change**

B. **Open Defecation Free Cities**

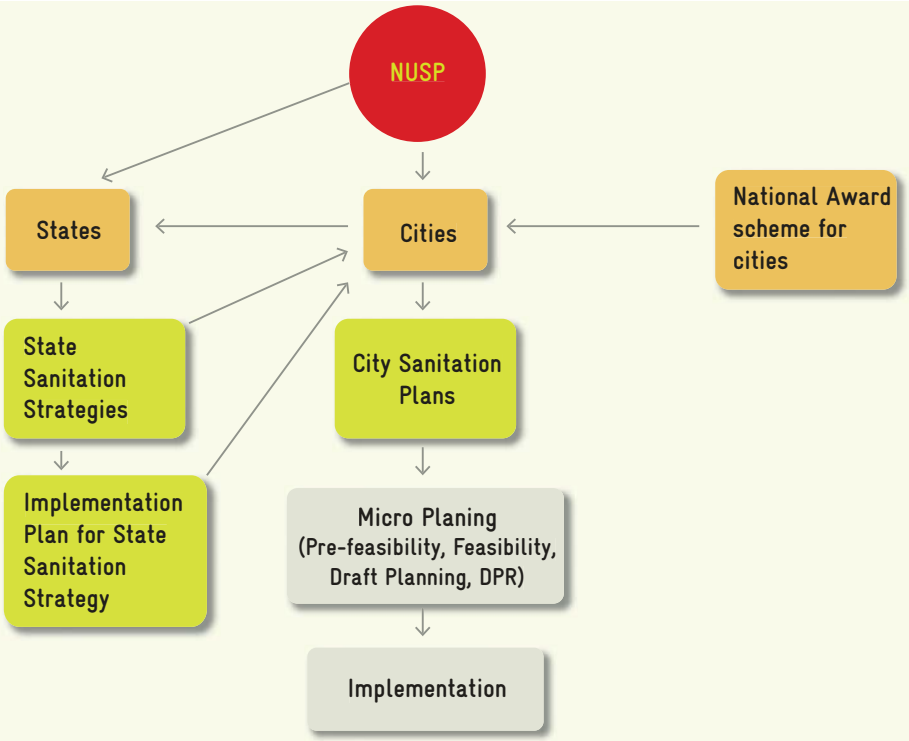
C. **Integrated City-wide Sanitation**

1. Re-orienting Institutions and Mainstreaming Sanitation.
2. Sanitary and safe disposal: 100 percent of human excreta and liquid wastes must be disposed of safely.
3. Proper Operation and Maintenance (O&M) of all Sanitary Installations.

IMPLEMENTATION OF THE NUSP

The NUSP defines the means of implementation of activities to achieve the above goals. States are encouraged to prepare State Sanitation Strategies taking into account their local urban context. Cities are urged to operationalize the state strategy, if already existing by preparing and implementing model City Sanitation Plans. The states will also be encouraged to formulate State Reward Schemes. A state level apex body will monitor the implementation of the state strategy, and a nodal agency will be appointed for planning and implementation. Each state and its cities would need to devise effective institutional arrangements at the city level. However, the ULB's (or their equivalent structure) must be at the centre of all urban sanitation activities. The following Fig. 9 illustrates the key steps envisioned in implementation of the NUSP:

Fig. 9 : NUSP Implementation Strategy

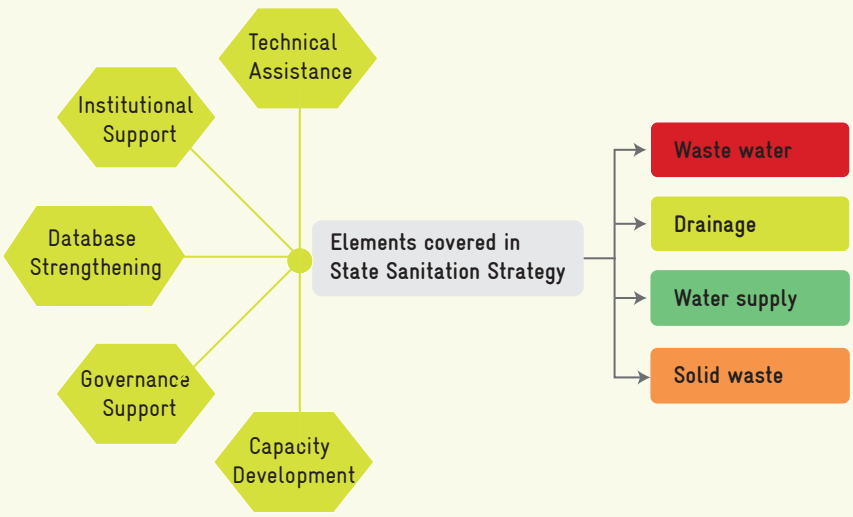


THE STATE SANITATION STRATEGY (SSS)

In India sanitation is state subject. Though implementation and the direct benefit are at the city, core functions like planning and decision making, the development of guidelines, distribution of financial resources and partial responsibility for implementation rests with state level agencies.

The State Sanitation Strategy introduced by NUSP aims at achieving the policy's objectives at state and city level by providing a state-wide vision, support mechanisms, sanitation standards and incentives for their ULBs. The State Sanitation Strategy should achieve convergence between sanitation-related sectors, between different programmes and the state and city scale to provide one coherent planning document. It should cover the technical sectors of Water Supply, Wastewater management, Solid waste Management and Drainage and include cross-cutting issues such as school sanitation and access to sanitation for women and the urban poor.

Fig. 10 : State Sanitation Strategy – Cross cutting elements



NUSP requires the State Sanitation Strategy to cover the following aspects[15] :

Clear assignment of institutional responsibility, resources and capacities

The SSS's must ensure clear ULB responsibility as envisaged in the 74th Constitutional Amendment (CA) and where this is partial or incomplete, states are to make concerted efforts to devolve powers, roles and responsibilities along with financial and personnel resources necessary for ULBs to discharge their functions. Alongside, the ULBs will also have to be accorded wide-ranging powers over agencies that currently carry out sanitation related activities in the city but are not directly accountable to them, e.g. para-statals and PHEDs.

Setting standards at the State Level (within the overall frame of national standards)

- Environment Outcomes (e.g. State Pollution Control Board standards on effluent parameters, diminishing water resources, impact of climate change, use of low energy onsite / decentralized wastewater treatment technologies, distributed utilities etc.), Public Health Outcomes (e.g. State Health Departments)
- Processes (e.g. safe disposal of on-site septage) and infrastructure (e.g. design standards) (PHEDs/ parastatals) and coverage of the informal sector activities like disposal of waste water, solid waste etc.
- Service Delivery standards (e.g. by Urban Development departments)
- Manpower issues such as adequate remuneration, hazardous nature of work, employment on transparent terms and conditions, use of modern and safe technology, provision of adequate safety equipment such as gloves, boots, masks, regular health checkups, medical and accident insurance cover etc.
- States are recommended to not just emulate but set their standards higher than the national standards in order to encourage its institutions and citizens to target higher standards of public health and environment.

Planning and financing at the State Level

It is the state's responsibility to devolve adequate and predictable resources to ULBs including setting tariffs, inter-governmental fiscal transfers, ensuring coordination across other government agencies and institutions, private and community institutions so as to highlight the priority of sanitation. Furthermore, planning and implementation of programs and allocating subsidies to the urban poor households. Further, the State Governments are also to reward the best performing cities to bring about a competitive spirit in achieving total sanitation.

Reaching the Un-served populations and the Urban Poor

States are to resolve tenure, space and affordability constraints to providing sanitation facilities (individual / community) and every urban dweller should be provided with minimum levels of sanitation, irrespective of the legal status of the land in which he/she is dwelling, irrespective of possession of identity proof or status of migration. The states are to earmark at least 20% of the funds under for sanitation sector for the urban poor and the issues of cross subsidizing the urban poor and their involvement in the collection of O&M charges should be considered.

15 Adapted from National Urban Sanitation Policy, Annexure I – Draft Framework for Developing State Sanitation Strategies; MOUD (2008)

Service Delivery in cities

ULBs are to be responsible for asset-creation and managing systems including service delivery. While they may bring in public, private and community agencies / groups to provide services on its behalf, the final accountability with regard to performance in sanitation has to be with the ULB. Departments and parastatals currently carrying out these responsibilities are to be accountable to the respective ULBs (including for example, financing through the ULBs). The State governments are to make explicit directions in this regard, including roles for NGOs and CBOs.

Regulation of cities and within cities

States are to strengthen existing state level institutions that are in charge of ensuring compliance of ULBs to environmental standards (e.g. State Pollution Control Boards), health outcomes (e.g. Health Departments), and Service Delivery Standards (e.g. State Urban Departments). The SSS has to state that the ULB has the key regulatory remit over all properties and agencies/households in the city in respect of outcomes and process standards stipulated by it.

Monitoring & Evaluation at the State and City Levels

The State government is to devise data collection and reporting systems using outcome indicators and be responsible for Monitoring & Evaluation (M&E) of its cities' performance. ULBs in turn need to track compliance of households (establishments, etc.) with outcomes and process standards that it has adopted. Introducing citizens' report cards, citizens' monitoring committees, self-assessment system, inter-city competitions, etc will be considered and NGOs and CBOs will play key roles.

Capacity Building & Training

The state strategy should identify special agencies of the state government, and/or NGOs and private sector organizations that will train its state level, ULB personnel and elected representatives to ensure that development of systems and capacities of ULBs in sanitation are in line with the Urban Sector Reforms that the state may be implementing. ULBs are to provide training on sanitation to their own staff – using state level resource agencies and utilizing GoI and State Government Schemes for training and capacity building in order to achieve this.

ROADMAP FOR FORMULATION OF STATE SANITATION STRATEGY

The State Sanitation Strategy is to be formulated looking at the requirements of the state, emerging from situational analysis and as per the requirements of NUSP through extensive consultations with all the stakeholders in the steering committee. This provides the necessary data to draft an evidence based plan of action.

From the experiences of SSS preparation, GIZ and its partner states have developed a road-map for SSS Formulation, which is in line with NUSP explained below in Fig. 11:

Fig. 11 : State Sanitation Strategy – Roadmap for Formulation

Advocacy and Agreement

As a first step a consensus is built between all related state departments that a State Sanitation Strategy should be developed. This often requires pro-active advocacy for sanitation by the concerned department since in the past it was not the most visible topic on a state's urban agenda.

Establishment of a State Level Steering Committee and Working Group

To achieve sectoral and programmatic convergence, the State Sanitation Strategy is recommended to be developed through an inter-departmental committee and working group. This increases the acceptance of this planning document and ensures the integration of all relevant data, information on on-going programmes and perspectives from different departments, such as education, transport, public health, etc.

Situation Analysis and Sector Assessment

The sector assessment provides the required state-wide data on urban sanitation to identify key issues and evidence for the development of a vision and a strategy. The sector assessment is based on consultation with the relevant departments and on data input from the ULBs.

Formulation of a vision and a goal

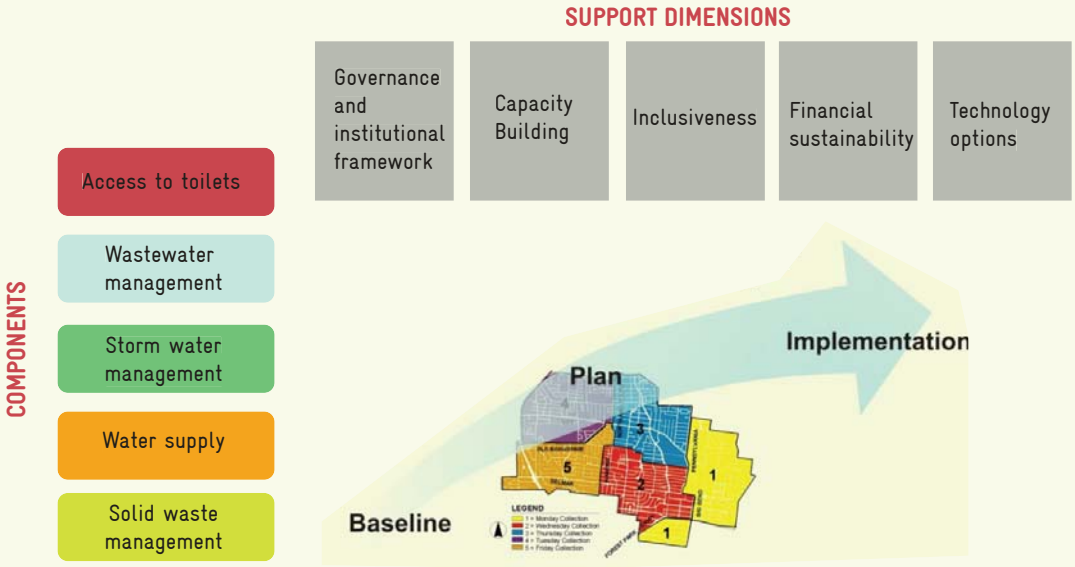
Based on the sector assessment a state-wide vision for the sanitation sector is formulated. It is recommended to formulate this vision under consultation with all ULBs in the state to achieve convergence between SSS and City Sanitation Plans.

Draft State Sanitation Strategy

As a last step the SSS is drafted including all the required elements from NUSP (see preceding sub-chapter). This SSS should then be ideally endorsed technically, administratively and legally to become a binding document

VIII CITY SANITATION PLAN (CSP): FRAMEWORK FOR CITY SANITATION SOLUTIONS

Fig. 12 : CSP Implementation Strategy



Experiences from the sanitation sector indicate that interventions in cities fail because of a lack of a well-designed planning process, a city-wide and systemic perspective, partial data sets and lack of attention towards institutional, financial and social aspects of technological choices.

The City Sanitation Plan was introduced by NUSP as a city-wide vision document for the sanitation sector. CSP details out how to plan and deliver sanitation outcomes of the city defined in NUSP to ensure a well collaborated approach engaging all relevant stakeholders.

The City Sanitation Plan should contain an assessment of the current situation and an immediate, short, medium and long term plan for improvement of the following services:

Table 4: Specific sectors / services to be considered in CSP

Services	Plan
Access to Sanitation Facilities (Toilets)	Plan for ensuring 100% sanitation access. This should primarily focus on the urban poor, thereby ensuring access to all socio-economic groups
Wastewater	Plan for safe collection, conveyance, treatment and disposal. Use of low energy consuming as well as decentralized systems should be encouraged. Also treated water should be recycled and reused for non-potable purposes
Solid Waste	Plan for safe handling and disposal of solid waste. Community managed solid waste disposal systems also need to be planned
Water Supply	Plan for improved water supply services. These should provide resilient solutions considering diminishing water sources and impacts of climate change
Storm Water	Plan for separate and safe drainage and management of storm water

ELEMENTS TO BE INCLUDED IN CSP

The above-mentioned services need to be supported by the including the following aspects in the CSP. It has been experienced that in absence of adequate attention to such issues, sanitation strategies fail to function in the long run. The NUSP therefore enlists the following specific areas to be covered for achieving the objective of the CSP[16]:

Technical Options for addressing sanitation issues / gaps

A mix of technology options should be considered to address city-wide challenges. The options should solve the sanitation issues holistically and not in an isolated manner.

Financial sustainability and institutional requirements

Permanent institutional responsibilities and sanitation implementation roles need to be specified to ensure accountability. Investments, costs and revenues need to be balanced so that the systems are financially sustainable.

Awareness generation and community participation

Time-bound programmes should be planned for participation of all stakeholders to generate awareness and bring about behavioural change. This will help in ensuring that sanitation facilities are used and maintained properly by the community thereby benefitting the city population in the long run.

Reaching to the Un-Served and poor households

Urban poor are the most affected group in terms of health impacts and lost earnings due to poor sanitation. It is important to include these groups through participatory approaches to address their specific requirements.

Regulatory / legal requirements

Many municipal laws discuss sanitation responsibilities, but these are not clearly laid out. It is the responsibility of the implementing agency to examine these laws and make recommendations to ensure responsibility and accountability.

Planning and Financing

With assistance of experts, the implementing agency should consider different aspects including institutional, social, technical, financial, etc. while planning and arranging for funds. The plans need to be comprehensive and cover the entire city.

Capacity Building & Training

Capacity building and training is crucial in achieving 100% sanitation. General training programmes for a range of municipal, NGO/CBO, private sector personnel as well as differentiated and specialized training on a demand-basis to personnel in and outside the government need to be planned.

16 Adapted from National Urban Sanitation Policy, Annexure II – Draft Framework for a City Sanitation Plan; MOUD (2008)

Strategy for Implementation

The success of a plan can only be judged by its implementation. Therefore the CSP needs to include a strategy as to how implementation will be managed and who will be responsible agencies for that.

Monitoring & evaluation and supervision

The implementing agencies need to take up monitoring and evaluation as an integral part of CSP. This needs to be done in collaboration with NGOs, community groups and independent third-party evaluators. The reports and findings should be made available to the public for feedback and suggestions.

For preparation of CSP, a citywide sanitation strategy should be prepared based on the actual situation and need of the city. That includes the existing status of sanitation, the gaps and challenges and the actions for each sector. Not only proposals for new assets should be included but existing services and their performance needs to be identified. It is most realistic and economical to prioritize improvement of existing services rather than creating an entirely new set of assets.

The CSP should be developed in a step-wise process to ensure high acceptance among stakeholder groups and evidence-based strategy development. The following steps are envisaged in brief -

- **Inception of CSP through formation of City Sanitation Task Force (CSTF),** which is a multi-stakeholder body comprising of representatives from various agencies (ULB, PHED, NGO's Private firms, end-users, civil society representatives etc.) to be constituted under NUSP. CSTF is to mobilize stakeholders to elevate the consciousness about sanitation in the mind of municipal agencies, government agencies and most importantly, amongst the people of the city. Among other functions, the CSTF will approve the City Sanitation Plan for the city and steer the process prepared by the Urban Local Body after consultations with citizens
- **Assessment of the existing sanitation situation,** including the existence, performance and quality of sanitation services and non-technical aspects, as well as the challenges needs to be conducted and this data is compiled into a Status Report.
- The sanitation data is further to be critically analysed for identification of **key sanitation issues** based on actual evidence.
- **Recommendations for intervention addressing the key issues identified** related to proposed new facilities and services or development of supporting aspects such as governance arrangements, capacity building, awareness raising are formulated. The recommendations may also touch upon priority locations. These recommendations then have to be structured into an Action Plan with short, medium and long term activities.

WHAT DOES CSP ACHIEVE?

The process of preparing the City Sanitation Plan (CSP) is unique and innovative since it provides a robust baseline information database, which makes it possible to understand the existing system with its flaws and opportunities. The document not only focuses on technological options integrating different sectors (wastewater, water supply, access to toilets, solid waste and storm water) but includes planning for a robust institutional set up and financially sustainable options.

The City Sanitation Task Force leads the process of developing the CSP and the participatory nature of the same makes awareness generation possible right from the inception. Thus the CSP represents a city-wide integrated, comprehensive planning document for the sanitation sector which has been accepted by the relevant stakeholders and is in line with other sectors and planning documents such as CDP

and Master Plan[17]. Such a living document can truly guide the transformation of the city into community driven, totally sanitised, healthy and liveable as envisaged by the NUSP. From a practitioner's point of view the CSP also provides the overall planning document for identifying suitable priority projects that can be submitted under various national and state funding schemes. CSPs also facilitate the completion of planning formats under national urban missions such as AMRUT and Swachh Bharat Mission.

PREPARATION AND IMPLEMENTATION OF CITY SANITATION PLAN OF KOCHI, KERALA

CASE EXAMPLE 1

Brief: The City Sanitation Plan for Kochi was prepared by Kochi Municipal Corporation (KMC) in 2010-11 as a complete city level planning document on sanitation sector which was followed from the guidelines issued under the National Urban Sanitation Policy (NUSP 2008). It was duly endorsed by a formally constituted CSTF and approved by KMC and State Government in 2011. Post preparation, it is observed that, while there have been improvements and potential impacts in several areas (notably improved coverage of solid waste collection, improved availability of water and augmented waste-water treatment capacity), implementation of actions pertaining to other strategic dimensions particularly institutional framework, capacity building, information management and financial sustainability need renewed focus and greater attention.

CSP has also been used by KMC as a base document for sanitation planning and implementation of interventions to improve infrastructure and service delivery in sanitation sector. Going forward the KMC is putting in place a clear institutional structure, greater focus on strategic dimensions and softer implementation aspects (including communication and stakeholder participation) and designated nodal accountability within its department and at the State level that is expected to facilitate greater ownership and effective implementation on ground. The CSP has largely succeeded in raising awareness among various stakeholders and bring escalated attention to sanitation issues within KMC.

Outcome / Impacts: One of the key components in the CSP of Kochi was septage management. The treatment of septage is one of the essential components of sanitation especially in a city like Kochi. Hence during the updation of CSP, it is recommended to treat septage management as an independent plan component especially for Kochi, which depends extensively on onsite sanitation. Keeping this in mind the KMC developed a DPR on implementing a phased investment program for waste-water management in Kochi Urban Agglomeration.

Key messages: The CSP is a sector-level planning document and is aimed to address the tendency of moving straight to preparation of DPR and project implementation. By pushing the need for an information baseline based analysis and stakeholder participation, the CSP exercise at one level could potentially help ULBs to assess and evaluate choices in front of them rather than choosing and implementing sub-optimal choices.

Further Details: www.urbansanitation.org

17 For more information on the cross-sectoral integration of CSP with other planning documents, please see the next chapter.

KEY MESSAGES FROM MODULE 1

1) A functioning and service-oriented sanitation system will improve public health and environmental conditions significantly, lead to economic growth and foster inclusiveness of vulnerable groups of society.

2) The main challenges of urban sanitation are absence / inadequacy of infrastructure, mismanagement of services, lack of coordinated planning and misuse of services.

3) The City Sanitation Plan is the most important planning tool for city-wide sanitation systems introduced by NUSP but equally relevant for upcoming schemes like Swachh Bharat Mission.

MODULE 02

HOW TO INTEGRATE CSP IN URBAN PLANNING

LEARNING OBJECTIVES

- To understand the various connections that City Sanitation Plans have with other urban planning tools and how to align those documents
- To get an overview on the inter-linkages between sanitation and related sectors, such as solid waste management, urban infrastructure and livelihood generation

Module No. 2 leads on from the learning's of the previous module in bringing greater focus to CSP as one of the planning tools for the urban sector and how to integrate it with other plans and programs. The discussion begins with laying out the various planning tools at different scales of urban governance with a direct relevance to the CSP. The importance of converging and coordinating different plans, schemes, legislations and sectors, is explained here. Finally, the discussion moves towards the various intricate linkages between sanitation and other aspects of urban services, which also must be accounted for in the CSP.

I. EMBEDDING THE CSP IN URBAN PLANNING

When there is any discord in any component of the urban set up, it is the Urban Local Body that is held responsible since they are directly accountable to the citizens for various local planning portfolios (including water & sanitation).

Under the NUSP, with the responsibility now falling upon the ULBs to come up with their own City Sanitation Plans, it is important not to let the CSP be just another pile of papers without relevance for the situation on the ground. They need to be working instruments of change, to be implemented for all its citizens in an economic, environmentally friendly and sustainable manner.

This is not feasible unless the CSP is coordinated and converged with all other planning and implementation instruments, within the sanitation sector and beyond. Thus the CSP must be developed in line with the administrative instruments existing like the Municipal By-law, Development Controls Rules and other statutory plans.

Different strategies and approaches are needed to ensure harmonious integration of the CSP in line with many other planning documents. For e.g. the City Master Plan (described below) is a statutory instrument and is absolutely binding. Similarly laws and regulations are not just indicative for planning of sanitation services but they have to be strictly followed. Thus the CSP must be in compliance with and cannot include any strategies contradicting the Master Plan or any law in place. Further the CSP needs to be in coordination with certain other city-level plans like City Development Plan or the Housing For All Plan of Action etc. to ensure smooth processes and harmonious functioning. Also there must be convergence of the CSP with plans from other sectors relevant to sanitation like transport department, Airport / Railway trusts etc. Fig. 13 shows the three types of relevant areas that the CSP needs to be in tandem with to ensure its effective planning and implementation.

Fig. 13 : Embedding CSP into urban planning

ULB-LEVEL PLANS

Beyond the CSP there are other important tools for urban planning. Thus the CSP must be a document drafted after much research into the scope and implications of other planning instruments and discordant notes must be straightened out. Not all ULBs have all the below mentioned plans, but the main requirement is to identify all existing planning documents and put the development of CSP in line with those.

City Master Plan

A city master plan defines specific division of urban territory (for e.g. residential, industrial, open spaces, etc.) and provides a generalized framework. It is developed for the city as its blue-print for the future which lays a greater emphasis on spatial aspects and sets the regulatory framework for the city-wide growth and development. It is an instrument to work out space and infrastructure required and to allocate land to various uses for harmonious and sustainable distribution of land so that towns and cities are provided with a form and structure within which they can perform their economic and social functions effectively and efficiently.

CSP and other ULB level plans

- Master Plan is a binding document and needs to be checked before preparing CSP and suggesting projects
- Other existing plans provide data required for CSP
- Priorities of CDP and CSP can be aligned.
- Check existing plans for other proposed projects in selected areas.

The Third Five Year Plan defines Master Plan as "*a **statutory instrument** for controlling, directing and promoting sound and rational development and/or redevelopment of an urban area with a view to achieving maximum economic, social and aesthetic benefits.*"[18]

City Development Plan (CDP)

A City Development Plan is a comprehensive document outlining the vision and development strategy for future development of the city, prepared in consultation with a wide range of stakeholders to identify the thrust areas to be addressed on priority basis in order to achieve the objectives and the vision. It thus provides the overall framework within which projects are identified and put forward in a City Investment Plan[19].

Swachh Bharat City Plan and SLIP

It is understood that without proper plan cannot be achieved to attain the objectives of Swachh Bharat Mission. To ensure that a proper plan is prepared to attain the objectives of the Swachh Bharat Mission, the MoUD, GoI revised the City Sanitation Plan Template and requested ULBs above 1 lakh population and all Class I cities to prepare and submit the Swachh Bharat City Plan for release of the second instalment of central assistance as per the Swachh Bharat City Plan template by 31.08.2015.[20]

Under the Mission, for ensuring that all households are covered with water supply and sewerage (including septage) connections, the ULBs are expected to prepare a strategy plan i.e. Service Level Improvement Plans (SLIPs). The ULBs are expected to assess the service level gap and explore alternatives to do more with less resources and do it in a way that the benefits reach the people in the form of taps and toilets. Further the ULBs are expected to estimate the total requirement of funds for achieving universal coverage for water

18 Administrative Staff College of India (ASCI);JNNURM –Regional Capacity Building Hub; Module 1 – Urban Governance

19 Revised Toolkit for Preparation of City Development Plan; JNNURM; MoUD, Govt. of India (2012)

20 For more information see AMRUT - Mission Statement & Guidelines available at http://amrut.gov.in/writereaddata/AMRUT%20Guidelines%20.pdf

supply and sewerage (Master Plans) for each ULB. The ULB is also to prioritize the zones to be taken up in the first, second, third, fourth and fifth year of the Mission and to ensure meticulous financing procedures.

Housing for All Plan of Action (HFAPoA)

It is a city level action plan with investment requirements projected and prioritized for provision of houses for the urban poor for the next 10-15 years, to be prepared by all cities under the Housing for All Plan of Action. HfA was launched in 2015 by Ministry for Housing and Urban Poverty Alleviation, Govt. of India and the specific guidelines contain provisions for new housing constructions as well as slum redevelopment. The HfAPoA is based on the earlier city-level planning document for slum upgrading under Rajiv Awas Yojana, the Slum Free City Plan of Action.

City Mobility Plan (CMP)

A mobility plan presents visualization of various mobility patterns with respect to people and goods and presents policies to achieve this vision. It focuses on the mobility of people addressing urban transport problems and promoting better use of existing infrastructure (i.e., improvement of public transport, pedestrian and non-motorized transport facilities) which as such leads to the integration of land use and transport development and is essential to building smart cities. It is important to note that CMP must be workable to be an integral part of the Master Plan.

Solid Waste Management Scheme

Municipal solid waste management schemes consist of a detailed format for organization and disposal of the solid waste generated in the city. The plan consists of storage, segregation, collection, transport and disposal / recycling of the waste products generated in the city.

Detailed Project Reports from various on-going / planned projects

A Detailed Project Report (DPR) is a document and tool introduced by introduced by JnNURM for cities to develop the detailed planning of project implementation and to access funds of the central and state government of project implementation and access to funds of the central and state government. Ideally a DPR should include the rationale, clear definition of the concept and scope, cost estimates, the required institutional framework, financial structuring, the phases of implementation, a plan for operation and maintenance as well as an assessment of financial sustainability and benefits of the selected project.

LEGISLATIVE FRAMEWORK

Municipal By-law

Municipal By-laws apply to certain limited matters and they are a form of delegated legislation since they are made by non-sovereign, deriving authority from the sovereign Acts. A local council or municipal government gets power from the national / state legislative instrument which specifies what things the town or city may regulate through those bye-laws. Common bylaws include wastewater reuse/recycle, rainwater harvesting, building and construction, etc.

CSP and legislative framework

- Law and regulations need to be followed for any interventions planned by CSP.
- CSP can include recommendations on new municipal bye-laws

Development Control Rules

Development Control Rules apply to any building activity and development work under the city jurisdiction.

OTHER RELEVANT SECTORS AND THEIR AGENCIES

The sectors listed below can impose additional requirements for sanitation services or may compete for available resources in terms of water and land for facilities and disposal. These activities should be considered in a CSP and the sector departments should coordinate their work with the results and findings of an already existing CSP.

CSP and other agencies

- Representatives of agencies can be invited for the City Sanitation Task Force for informing them about sanitation priorities and plans.
- For finding available land for proposed projects in CSP these agencies are important partners.

Airports / Railways / Ports authorities

These sectors can put pressure on available land and water resources for a particular city and hence they must be considered while drafting a City Sanitation Plan.

Industrial Development Corporations

Industrial Development Corporations provide the support infrastructures and economic environment for development of industries in a city. Hence additional sanitation and wastewater management infrastructure for these industries and for peripheral residential developments need to be planned in accordance with them.

Irrigation Department

The irrigation department or the department of water resource management tackles irrigation projects of the state and the water management for the same.

Slum Clearance Boards

Slum Clearance Boards are administered by the state governments. Their main function is to eradicate slums and provide hygienic tenements to the slum residents.

Fire Department

A fire department is a public or private organization that provides predominantly emergency fire-fighting and rescue services for a certain jurisdiction, which is typically a municipality.

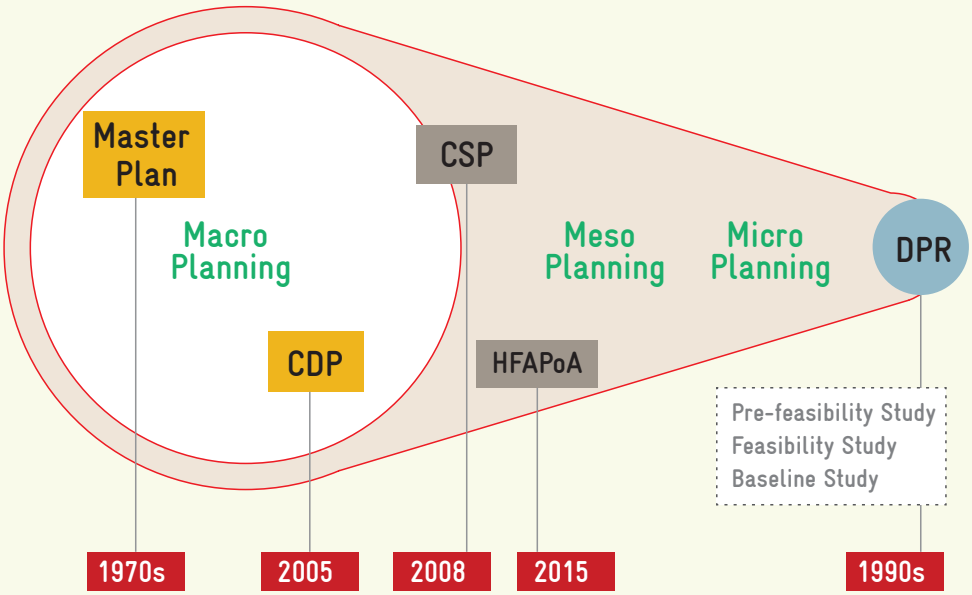
II. SCALES OF URBAN PLANNING: MACRO, MESO AND MICRO LEVEL PLANS

Master Plans and CDPs are macro-planning tools which cover the overall city-level and do not focus on one selected sector. For any city, Master Plans lay down the spatial requirements for the coming years, whereas a CDP is a comprehensive document outlining the vision and development strategy for future development of the city. It is prepared with a wide range of stakeholders to identify the thrust areas to be addressed to achieve the objectives and the vision.

The meso level plans like the CSP or the HFAPoA are specific to a particular sector (like sanitation sector or housing) within the expanse of the area covered by the Master Plan / CDP. They usually refer to the urban areas mostly in the form of a zone or a cluster of local areas which require specific actions and investments within the framework of the macro-plans.

Finally the micro level planning relates to a specific project covering a selected area of ULBs. This can be an administrative area, such as a ward, or a project-related area (e.g. riverfront neighbourhood). Detailed Project Reports are examples of such micro-planning tools. Once the priorities are set by the ULBs in the vision document of CDP or sector plans, identified projects require a detailed report for accessing funding from central or state government or private investors. Individuals DPRs must focus on the technical and financial feasibility of the project along with the financial mechanism for its implementation.

Fig. 14 : Urban Planning Tools in India along with their year of introduction



The above mentioned plans not only cover different sectors of urban development but are designed for a specific scale of the city. For urban strategies to be successful on the ground, planning processes at all scales need to be coordinated.

III URBAN PLANNING: COHERENCE WITH OTHER DEVELOPMENTAL SCHEMES

In the past decade, Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Rajiv Awas Yojana (RAY), and the Urban Infrastructure development Scheme for Small and Medium Towns (UIDSSMT) were key programmes of the Central Government, to source funding apart from State Government's own resources to the cities.

Since 2014 the Government of India has launched a number of new schemes like AMRUT, Swachh Bharat Mission and Smart Cities, which take into account the importance of sanitation as indicated in the National Urban Sanitation Policy 2008. Therefore significant interrelations between the schemes and the City Sanitation Plans are to be considered while preparing and implementing the CSP. Planning should be aligned to such existing funding sources and should seek to derive maximum benefits. Using these synergies will make the implementation and strengthening of a city-wide sanitation system more resource-efficient and sustainable.

Table 5: Recent schemes targeting urban sanitation and their inter-relation to CSP

Name of the Scheme	Content of the scheme	Interrelations with Sanitation and CSP
Swachh Bharat Mission (SBM) (2014-2019)	Swachh Bharat Mission was launched in 2014 by MoUD with following objectives: • Elimination of open defecation • Eradication of Manual Scavenging • Modern and Scientific Municipal Solid Waste Management • To effect behavioral change regarding healthy sanitation practices • Generate awareness about sanitation and its linkage with public health • Capacity Augmentation for ULB's • To create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance) All statutory towns are eligible for this mission.	Under SBM emphasis has been given for preparation for Swachh City Plan and SSS as strategic planning documents. First concept note on State Strategy to be submitted by 30 January 2015. There are funds/grants available for household and community toilets as well as solid waste management projects. DPRs developed under this Mission need to emanate from CSP. Support to IEC and capacity development activities are also given under this mission.
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	This mission aims to provide infrastructure facilities in water supply, sewerage and public transport facilities etc. in 500 selected cities. **Objective** • To ensure that every household has access to a tap with assured supply of water and a sewerage connection • To increase the amenity value of cities by developing greenery and well maintained open spaces (e.g. parks) • To reduce pollution by switching to public transport or constructing facilities for non-motorized transport (e.g. walking and cycling). **Components** The components of the AMRUT consist of capacity building, reform implementation, water supply, sewerage and septage management, storm water drainage, urban transport and development of green spaces and parks.	Projects identified in the CSP for water supply, sewerage, septage management and storm water management are eligible under AMRUT. CSP should be used as input document for preparing the main urban planning tool under AMRUT, the Service Level Improvement Plans (SLIP).
Housing for all by 2022 (2015-2022)	Based on the experiences from JnNURM and Rajiv Awas Yojana (RAY) the "Housing for all" Mission by MoHUPA has been launched in June 2015. The main components of this mission are: • In-situ slum redevelopment using land as a resource • Affordable Housing through credit-linked subsidy • Affordable Housing in Partnership • Subsidy for beneficiary-led individual house construction	Slum settlements are often the sanitation "hot-spots", which need urgent action. Under the component of Slum redevelopment, sanitation infrastructure will be an important part.

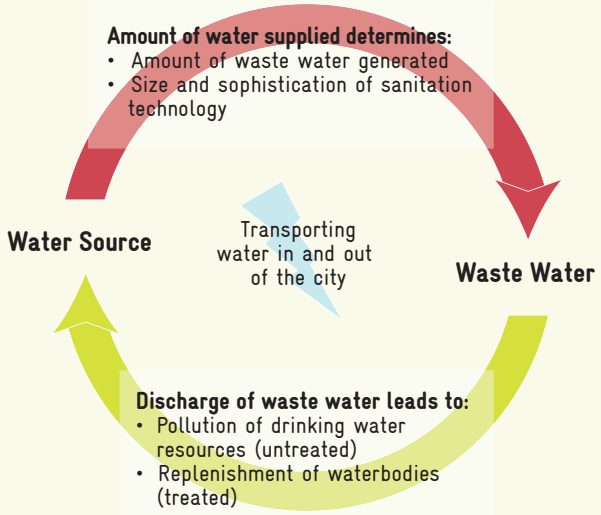
IV LINKAGES: URBAN SANITATION AND URBAN DEVELOPMENT

The core definition of sanitation is the safe management of human excreta including its safe confinement, collection, treatment, disposal and associated hygiene-related practices. This focuses primarily on management of wastewater and fecal sludge but the sanitation sector includes directly related practices such as water supply, storm water drainage, access to toilets and solid waste management. Therefore the inter-linkages between management of human excreta and related practices must be understood in detail to develop integral sanitation solutions.

Beyond that, the sanitation sector is interdependent with other relevant urban sectors, for example urban infrastructure and social inclusion. The impacts these sectors have on each other and useful synergies will be explored.

SANITATION AND WATER SUPPLY – WASTE WATER GENERATION

Fig. 15 : Water supply and waste water generation: cause – effect relationship



Water supply and sanitation both are key indicators of the Human Development Index (HDI) included as a part of the Millennium Development Goals (MDGs) and will find a place in the Sustainability Development Goals (SDGs) which will begin Post-2015.

The sanitation facilities have an impact on the city's water sources and hence the following points need to be borne in mind while planning water supply and wastewater treatment facilities:

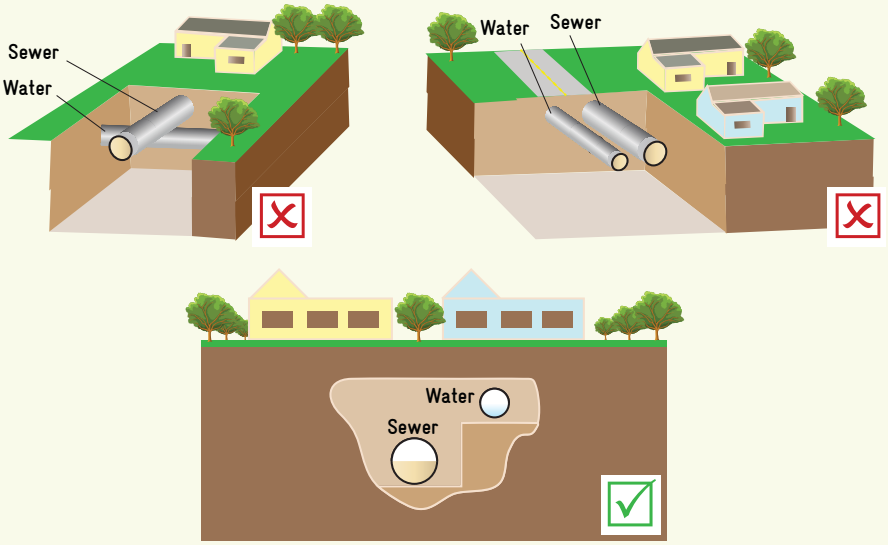
Since the quantity of water supplied directly affects the volume of wastewater generated, a balance between the two needs to be considered in planning. These facilities need to be planned in tandem with each other and cannot be considered in isolation. Wastewater treatment facility should also take into consideration the water supply and usage that have been provided. Smart design of wastewater management systems (including on-site sanitation systems) can significantly contribute to the reduction of freshwater usage, an environmental need of the hour in India and many other countries.

- Water treatment and regular quality monitoring is a must. This is essential in maintaining the quality of water being supplied to the public so that it does not adversely affect health.
- Leakages can often be seen in ill-maintained water supply and waste water conveyance systems. These can not only increase the costs of water supply caused due to wastage, but can also be a source of potential contamination both of *ground water* as well as surface water by *direct discharge into water bodies*. To avoid such scenarios, an effective leak detection mechanism needs to be in place.
- In most urban settings, the poorer localities have limited access to water and sanitation facilities as compared to the more affluent localities. Owing to the space constraints, financial inhibitions and sometimes, social settings, it becomes difficult to provide and maintain basic water and sanitation facilities and this leads to unsustainable practices like open defecation, stagnation of water (further leading to breeding of mosquitoes and malaria) and *open direct waste water discharge*. This can become source of contamination and result in poor public health and environmental quality. Thus it is recommended that water supply and sanitation facilities be regularly surveyed in poor localities to ensure their maintenance and utility.
- On one hand the urban population is increasing and on the other the *fresh water resources are depleting*. It is becoming increasingly difficult to meet the water demands of the population. Technical solutions

such as localized treatment systems, short conveyance systems, and vacuum sewers amongst others, the fresh water required for transportation of faeces through a sewerage system can be significantly reduced. With adequate treatment it is possible to reuse water for applications like toilet flushing, gardening and landscaping, construction, dust suppression etc. Around 45 lpcd of water can be easily re-circulated which will greatly reduce the burden on freshwater sources.

- Conventional systems of treatment and transport of water and wastewater consume a lot of energy. To keep costs at bay, it is necessary to ensure that energy efficient systems are implemented.
- While constructing water and wastewater networks, fresh water lines always need to be kept at a level higher that the sewage lines. This is to ensure that leakages in the sewage pipe do not cause contamination in the fresh water supply.

Fig. 16 : Sewer line positioning with respect to water supply connections



SANITATION AND SOLID WASTE MANAGEMENT

Solid waste generally refers to all the wastes arising from human (or even animal) activities that are normally solid in nature and that are discarded as useless or unwanted and consists of highly heterogeneous mass of materials. It is pertinent to note that most definitions of sanitation, such as the one given under the National Urban Sanitation Policy, include solid waste as one essential area of the sanitation systems.

Fig 17: Impacts of solid waste mismanagement on water services

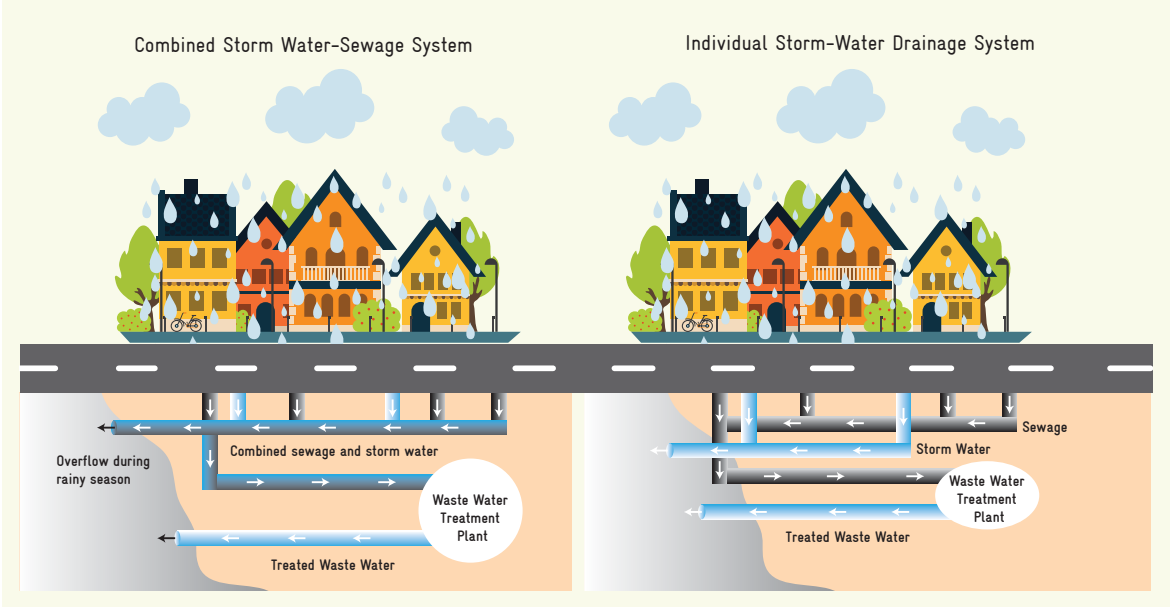
- Solid Waste Management is one of the imperative components of a city-wide sanitation system. Without a sound waste management system, it is likely that the conglomerate waste will eventually end up clogging up natural open spaces, storm water drains, city's sewer systems etc.
- This is a cause for concern not merely as an inconvenience, but as significant public health liability. The dumped garbage stifles the water sources (ponds, lakes, rivers) and increases its organic content subsequently making it unfit for use by people.
- Further, such wrongly disposed waste causes clogging in storm water drains and sewers leading to overflow of drains, water logging problem, contamination of fresh water sources and disease spread. Solid waste mismanagement results in clogging at water treatment plants (in case of centralized systems) and causes hardships for maintenance of the STPs which is both dangerous and uneconomical.

SANITATION AND STORM WATER MANAGEMENT

Storm water is the water which drains off the ground surfaces after precipitation / rainfall. It depends on the intensity, duration of precipitation, characteristics of the area, and the time required for such flow to reach the sewer. The following points needs to be kept in mind while dealing with storm water:

- In India sewer lines are generally not intended to carry storm water runoff. Separate drainage lines are required to be constructed for carrying this water. Combined sewers are generally used in the European context, but are not recommendable for water starved areas.
- Storm water is far less contaminated than wastewater. Combining storm water with wastewater only increases the volume of water to be treated to a great extent. This in turn makes it difficult to plan the treatment facilities due to the large amount of wastewater which needs to be accounted for and equalization tanks have to be provided at the Sewerage Treatment Plant.
- Since storm water has very low pollution load, they are directed to surface water bodies or ground recharge areas. It is important to ensure that effluent from septic tank and wastewater treatment facilities do not overflow into the storm water drains. Effluent contaminates the surface water bodies and harms the health of the people and environment downstream.
- Storm water drains need to be properly maintained and managed. It is a good practice to service the drains regularly and especially before the onset of monsoons. This becomes even more important in areas receiving high rainfall. Clogging / choking of storm water drains can cause flooding and havoc in urban areas.

Fig. 18 : Storm water drain system



SANITATION AND URBAN INFRASTRUCTURE

Urban infrastructure constitutes different components like roads and footpaths, drainage networks, water pipes, public spaces, street lighting, etc. While each of these has individual importance in providing services for the public, planning for the same needs to be done in consonance with each other. Concrete suggestions for integration of sanitation into planning of other urban infrastructure are:

- Inclusive planning and designing of roads (integrated waste water drains and storm water drains)
- Manholes and sewer lines to be given utmost care during road repair / construction to avoid damages
- Co-ordination with traffic management during construction of sewers
- Communication of infrastructure development strategy to sanitation department for timely amendment or up-gradation.
- Including new data in plans and concepts, check capacities of downstream elements (main sewers, main drains, CETP etc.)

SANITATION AND INCLUSION OF WOMEN AND THE URBAN POOR

The ill effects of missing or insufficient sanitation services are substantially higher for disadvantaged groups of society, such as women, the urban poor, elderly, children and differently-abled. They face more barriers in accessing existing services and while designing conventional sanitation solutions their requirements are not sufficiently taken into account.

- ***Sanitation and gender*** - The term gender refers to women's and men's different roles, resources, and experiences, aspects of culture that all of us learn in our own societies as we grow up[21]. Very often, women's and men's roles and resources are not only different, they are also unequal. Whilst there are instances where men are disadvantaged in comparison to women, generally women and girls have fewer opportunities, less access to resources, lower status, and less power and influence than men and boys. For e.g. women are hit hardest by inadequate sanitation and water services. Women and girls don't need toilet facilities just for defecation; they also need privacy and dignity when menstruating[22]. Menstruation, pregnancy and the post-natal period become more problematic if women have nowhere to adequately take care of themselves. Separate toilets at school lead to higher attendance of girls and more girls are likely to stay on after puberty to complete their education. Women are responsible for most of the tasks like fetching water from far away, cleaning toilets, taking care of children etc. The NSS Report No. 556: Drinking Water, Sanitation, Hygiene and Housing Condition in India (2012) notes "When drinking water had to be fetched from a distance....in urban India, female members performed this task for 72.0 percent of households and male members in 23.5 percent". Further, women seldom have exclusive land ownership rights, which affect not just their societal status but also their ability to mobilize financial resources for sanitation services. They are hardly ever considered important in policy and decision making processes, increasingly marginalizing them. This burden coupled with lack of adequate sanitation facilities and societal pressures emanating from issues like privacy have always subjected women to poor health and indignities.
- ***Sanitation and the urban poor*** - The sanitation apathy in respect of the urban poor is another challenge and many of them are exposed to multiple health risks associated with bad water and sanitation. Urban poverty is generally associated with poor quality housing, overcrowded, unsanitary slum settlements, ill-health related to spread of infectious diseases etc. The urban poor living in slums very often depend on surface streams for water supply and resort to open defecation. Urban poor living in slum settlements generally suffer from lack of formal tenure and therefore face limited access to sanitation services provided by public authorities. The informal sector managing many sanitation services such as garbage collection, scavenging works, etc. consist mostly of workers from disadvantaged

21 Advocacy Manual for Gender and Water Ambassadors, GWA (2002)

22 Sanitation Drive to 2015 – Planners Guide, UN-WATER, 2012

sections of society. Therefore they face insanitary working conditions, lack of social security, labour representation and strong effects on their health in the long run.

Due to these inter-linkages between sanitation and various components of urban development, lack of meticulous planning and implementation of services results in various problems which have far reaching impacts. The Table 6 below represents these problems and suggests possible solutions to the same.

Table 6: Inter-linkages between sanitation and other urban sectors

Sector with Sanitation Linkage	Problem Statement	Impacts	Solutions that can be adopted for CSP
Water Supply	• The higher the use of fresh water, higher is the volume of wastewater generated • Need to cater to the dense population • Inadequate treatment of wastewater, in both quantity and quality, leads to pollution of surface water sources. • Groundwater is not acknowledged as an important source of water supply for cities and is not featured adequately in planning processes.	Huge costs are incurred in transporting fresh water throughout the city perimeters and alternately carrying wastewater / sewage out of the city	• Ensuring balance between consumption and type & capacity of waste water disposal facility. • Ensuring water treatment provisions and monitoring of water quality • Installation of effective leak detection system • Surveillance of water supply and sanitation services in poor localities • Promoting re-cycling, recovery and reuse of waste water resources • Assuring energy efficiency in operation
Solid Waste Management	• Bad management of solid waste • Non – Innovative, measures deployed, no stress on Reduce – Recycle – Reuse Principle • Contamination of Water sources • Blocking and chocking of drains, stagnation of water; overflowing waste water. • Reduction in functional efficacy of drains (waste water /storm water) • Filth, odour, danger to health	Unhygienic Conditions Precarious implications on health of manual workers in this sector	• Ensuring adherence to Municipal Solid Wastes (Management and Handling) Rules, 2000 • Emphasizing on door-to-door collection provisions, compulsory segregation of dry waste and wet / biodegradable waste, deployment of composting units in societies in urban areas, rules for landfill sites, rules regarding recycling of waste • Scheduling of drains and sewer clean ups • Starting software approaches like awareness generation for preventing littering by public
Storm Water Management	• Storm water lines are not constructed separate from sewer lines causing mixing of less polluted water (storm water) with heavily polluted sewerage.	The amount of water to be treated greatly increases. The storm water drains contaminated with effluent pollute surface water streams	• Construction of separate storm water drains distinct from waste water sewers • Awareness about combined versus separate sewers • Preventing overflow of effluent from septic tanks into storm water drains • Proper Operation and Maintenance of storm water drains.

Urban Infrastructure	• Planning for urban infrastructure is done without regards to inter-linked sanitation components leading to inconvenience during sanitation service delivery	Very often sewer lines, manholes are damaged during road repair and construction which can cause considerable public health concerns	• Inclusive planning and designing of roads (with integrated waste water drains and storm water drains)
Inclusion of Women and Urban Poor	• Disadvantaged groups of society, such as women, the urban poor, elderly, children and differently-abled face more barriers and hurdles in their progress when not supported with adequate water and sanitation services.	High Infant mortality rates Higher percentage of girl-dropouts from school Poverty and disease conditions Lack of social security Unequal opportunities for upliftment and progress	• Gender-sensitive and inclusive planning for sanitation services • Greater investment in sanitation services for the disadvantaged • Treating human waste as a resource with the potential to create jobs[21] • Ensuring that due dignity is given to sanitary workers and their health & safety concerns and the social stigma attached with the sanitation profession is reduced

23 Sanitation Drive to 2015 – Planners Guide, UN-WATER, 2012

LINKAGE BETWEEN INCLUSIVENESS AND SANITATION - REIMAGINING SANITATION AT KACHHPURA VILLAGE, AGRA, UTTAR PRADESH

CASE EXAMPLE 2

Brief Description: Kachhpura, a 300 year-old historic settlement located on the east bank of River Yamuna and directly opposite to the Taj Mahal, is a notified slum today. Its community toilet was dysfunctional; all the Kachhpura wastewater drained through open, kuccha drains, choked and overflowing at places where the gradients were uneven. Wastewater often drained into the low-lying municipal toilet, making access impossible and forcing people to defecate in the open; along the road leading to the toilet, the city drain, the fields or the riverbank. The Kachhpura School too, had no toilet and children went home or squatted on the drains in the central courtyard when in need. Kachhpura's household wastewater drained through open, kuccha drains, choked and overflowing at places where the gradients were uneven.

To improve the sanitation conditions in a socio-economically weaker settlement, Crosscutting Agra Programme (CAP) was launched by Agra Nagar Nigam (ANN) in 2005-06. CAP is a toilet-by-toilet and drain-by-drain development of Agra into an Open Defecation Free (ODF) city with comprehensive sanitation solutions. It has been supported by Centre for Urban and Regional Excellence (CURE). Under CAP, community toilets, new and renovated, have replaced the dysfunctional toilets with private sector funding and these toilets cater to the poorest families with low affordability. Significant ANN funding is now allocated to improving 156 city toilets. Many public toilets are maintained through PPP arrangements. Drains in slums are improved to carry house wastewater and septic tank overflows to a Decentralized Waste Water Treatment System (DEWATS) built under CAP in 2006-07. Entire system was constructed by community involvement (labour work). Post construction community and a local NGO were involved to carry out O&M and sustainability of project. Drain improvements are extended to entire wards under the State Bheem Nagari scheme. The DEWATS treats waste water from 13 upstream settlements in the city prior to disposal in the river, leading to a much cleaner Yamuna. It is also replacing sewage based urban agriculture practice with farming using treated water, minimizing pathogens in the urban food-chain and improving citizen health. By diverting waste water from the heritage Mehtab Bagharea, the DEWATS has long-term conservation impacts. Solid waste management has been regularized and an all weather road is connecting city waste to the new sanitary land-fill site.

Outcome / Impact: Clean and hygienic environment for slums. No mosquito breeding. Treated water discharged in Yamuna river. Incidence of disease and cost of health care has gone down in upgraded settlements; (From average Rs 700 to Rs 100 per month)

Hard Facts: DEWATS treats 50 KLD of waste water. Wastewater quality improvement: 60 per cent BOD, 64 per cent COD and 94 per cent TDS removal. Construction cost of the system was INR 10-11 lakhs, yearly O&M INR 70,000-80,000.

Further Details:
http://indiagovernance.gov.in/files/slum-agra.pdf | http://pdf.usaid.gov/pdf_docs/pdacw410.pdf

KEY MESSAGES FROM MODULE 2

1) To develop solutions for livable cities and to use resources efficiently, the CSP needs to be in line with all other documents relevant to urban planning at different levels such as the Master Plan, City Development Plan, City Mobility Plan, etc.

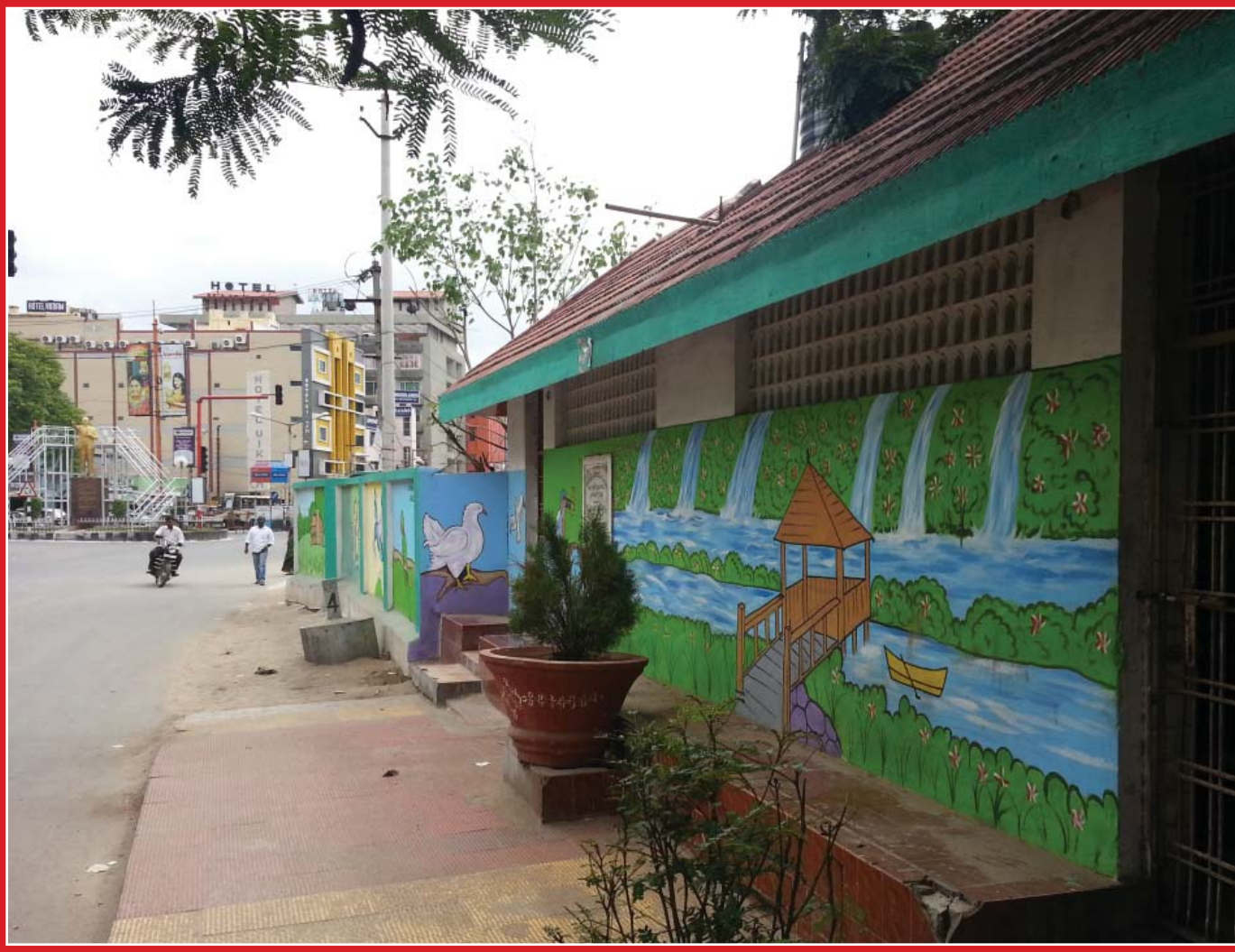
2) Solving the issues in sanitation cannot be limited to liquid waste management but includes others sectors like water supply, storm water drainage, access to toilets and solid waste management.

MODULE 03

URBAN SANITATION SYSTEMS AND SEPTAGE MANAGEMENT

LEARNING OBJECTIVES

- To understand the types, advantages and disadvantages of existing sanitation systems.
- To know about the importance of septage management for achieving improved sanitation in Indian cities.



This module provides understanding on prevailing sanitation management options in urban India. The module is arranged in two parts. First it gives an overview on different existing sanitation systems in Indian cities, such as on-site and off-site systems and decentralized and centralized systems. It explains the requirement for such systems and gives a list of factors to take into account when choosing the adequate system for a particular city or locality. Since, many small and medium towns in India completely rely on on-site sanitation systems with septic tanks, the management of human excreta needs particular attention. Therefore the second part of this module focuses on septage management.

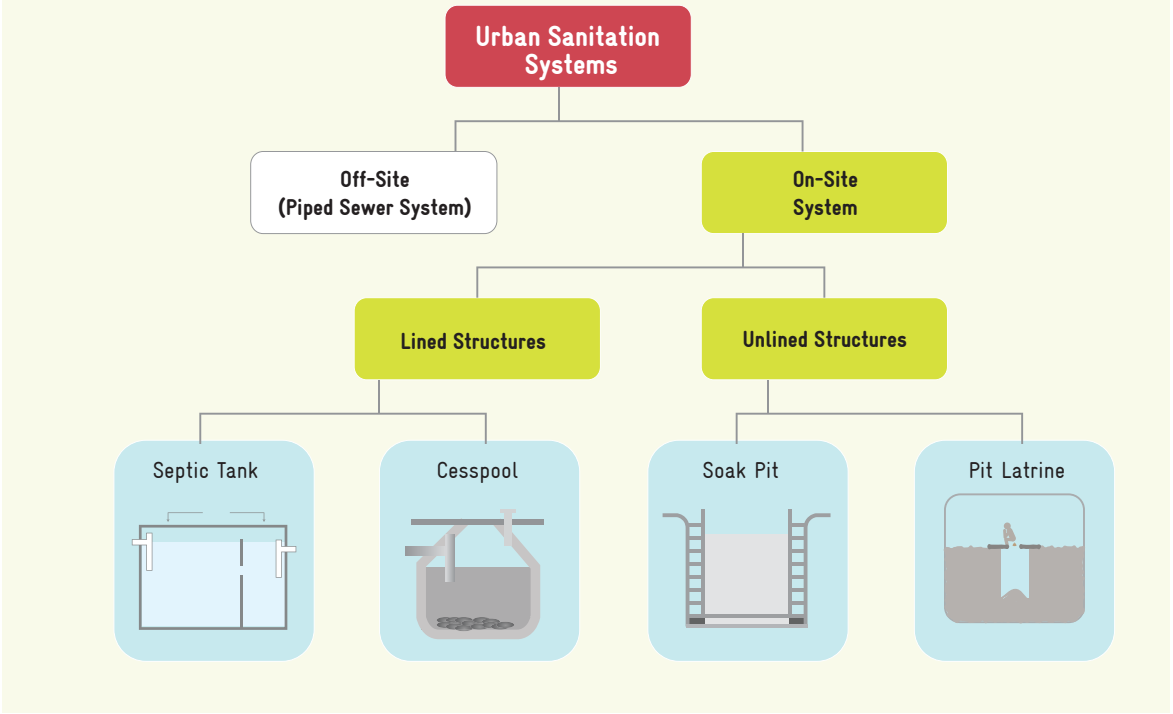
I URBAN SANITATION SYSTEMS

The sanitation scenario in India is elaborated in detail in module one. According to Census 2011, 18.6% households in urban areas do not have access to any toilets at home and are dependent on public latrine facilities or practice open defecation. The Census also indicates that about 32.7% of urban households are connected to a piped sewer network, whereas 38.2% households dispose their waste into septic tanks and 7% into pit latrines emphasizing the predominance of on-site sanitation. By 2017 numbers of household toilets connected to septic tanks will increase to 148 million urban people (USAID, 2010). Therefore on-site septic tanks and pit latrines will account for a considerable proportion of toilets in urban India. Growth in the usage of on-site sanitation systems (OSS) with septic tanks in coming years is foreseen and will be explained further in this chapter. An advisory note on septage management in urban India is available (MoUD, 2013). However, no separate policy or regulation for septage management exists in the country except countable examples. Moreover, the ULBs are also not prepared and equipped to efficiently handle the waste coming out of the OSS in India.

The capacities to handle the sewage with existing costly infrastructure (sewer network, STPs) are also limited and do not represent an encouraging scenario. Reports published by CPCB indicate that sewage treatment capacity in Indian urban areas is not at the optimum and is at almost half to its designed capacities (CPCB, 2009 & 2013). Module one provides more details on this aspect.

Cities and towns could have following sanitation systems. One that conveys the waste to some distance can be termed as off-site and the other one that treats waste at the site is on-site sanitation systems. Majority of towns and cities in India are largely depended on the OSS. In the upcoming chapter an emphasis is laid on the OSS and septage management, which refers to safe handling of its waste (solid and liquid).

Fig. 19 : Urban Sanitation Systems



Source: CSE-GIZ 2015

ON-SITE SANITATION SYSTEMS (OSS)

On-site sanitation systems are found in variety of circumstances in urban areas. Following is list of broad categories.

a. *Peripheral areas with low density population where provisions for sewer infrastructure in the vicinity are not available due to varied reasons.*
b. *Informal settlements of urban centres*
c. *Low socio-economic class localities having space constraints*
d. *Cities and towns which do not have adequate resources (financial/technical) for construction of sewerage infrastructure*

OSS could be dry or wet systems. If designed and managed properly, both of these can function efficiently and maintain hygiene. In true sense, if less water is used the OSS can be more successful than a poorly functioning complex sewerage systems. All possible OSS (wet or dry) in Indian conditions are provided with a pit, vault or tank to contain excreta. These pits need to be emptied at regular interval.

OSS can be further classified into lined and unlined structures (Fig. 19). The most prevailing OSS in India is septic tank as indicated in various national surveys (Census, NSSO). The details on septic tanks are covered in forthcoming text in this chapter. In general the construction of OSS in India is of substandard quality which pollutes water sources and affects health and hygiene, although the septic tank was integrated into the Building Code Act and therefore building regulations exist, which was one of the big steps forward for OSS in India.

OFFSITE SYSTEMS

Offsite system ideally comprises of household toilet, sewerage network (pipelines, manholes, pumping stations) and sewage treatment plant (STP). Waste water (black & grey) starts its journey from the household and is conveyed through sewerage network to STPs. After treatment in the STP the treated waste water is ultimately discharged into the environment, in most case rivers. Sewerage systems rely on a sufficient quantity of wastewater flow to convey solids along the pipe to a treatment or discharge point. Some cities (Delhi, Chennai) in India have initiated to reuse the treated waste water for irrigation purposes especially watering parks in cities to reduce freshwater consumption. Construction of offsite systems is complex, requires resources and time to develop. Moreover, maintenance of the offsite systems is challenging. At many places especially in small and medium town cities hybrid systems exist wherein the toilets are connected to sewer network via interceptor tanks.

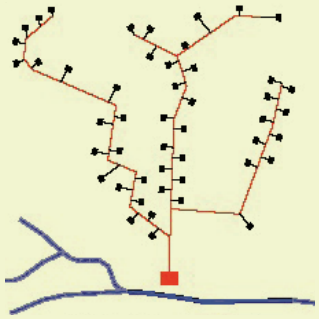
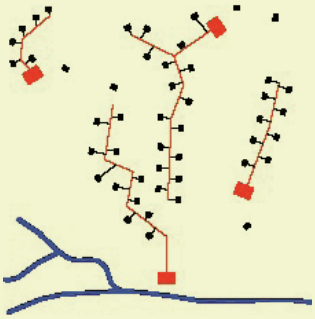
Both on-site and offsite systems can co-exist in a city-wide sanitation system according to the requirements, resources and land availability in the different areas. It is also important to understand at this point that offsite sanitation systems can exist at various scales i.e. city as well as neighbourhood. A residential colony or cluster of houses can have an independent off site sanitation system that consists all above mentioned components but it is not connected to large scale STP rather a smaller treatment system. In such a case, it is termed as decentralized system.

Difference between the centralized and decentralized systems is discussed in following section.

CENTRALIZED AND DECENTRALIZED SYSTEMS

In centralized systems the domestic waste from houses and buildings is conveyed to a common treatment facility (at the outskirts of cities and towns) through sewer network. On contrary, the decentralized options refer to treatment facilities which is not located away from cities / towns and treat domestic waste were locally for smaller clusters (Table 7). Comparison of centralized and decentralized system is as follows:

Table 7: Centralized vs. Decentralized systems

	Centralized System	Decentralized System
Layout	 Wastewater Treatment Facility	
Scale	Applicable at city/town scale with adequate water supply for maintaining cleansing velocity	Possible at household, institutional, neighbourhood scale with local water supply arrangements
Conveyance	Complex sewerage network to convey waste to treatment facility including energy dependent pumping stations	Simple sewerage network to convey waste over smaller distance
Planning	Requires planning at regional level considering overall growth of city	Requires local developmental considerations
Cost	Cost and technology intensive management systems	Economical and simple to manage systems
Flexibility in design	Modular arrangement is not possible	Modular arrangement as per space and reuse is possible
Implementation	Demands time and coordination among multiple agencies	Do not require much time and lies within local control
Energy	Demands extensive energy for conveyance, treatment and disposal	Minimal or even no energy required for conveyance and treatment
Inflow	Tolerant towards inflow for both quantity and quality fluctuations	Intolerant towards inflow for both quantity and quality fluctuations
Capacity	Suitable for large quantity of wastewater	Suitable for limited wastewater flows (1-1,000 m^3/day)
Human resource	Requires highly skilled manpower for planning, execution and operation and maintenance	Requires basic operational skills
Maintenance	Requires sophisticated or costly maintenance	Does not require sophisticated or costly maintenance
Reuse	Mostly will require transport arrangements like pipe network or water tankers	Local reuse options are possible without much infrastructure

Source: CSE-GIZ, 2015

CASE EXAMPLE 3

LOCAL REUSE OF TREATED WASTE WATER FOR IRRIGATION OF PADDY FIELDS AND FOR HORTICULTURE PURPOSE AT ARAVIND EYE HOSPITAL, PUDDUCHERRY, INDIA

Brief Description: The hospital is located at Abhishekapakkam, Pudducherry and has 15 acre of green area, including paddy fields. Their water demand for horticulture and irrigation was very high; hence the hospital adopted decentralised wastewater treatment system (DEWATS) in the year 2003 that treats 270 – 320 kld of domestic waste water from the campus. The system is designed to treat 320 KLD of wastewater.

Black and grey water streams are separated and treated in the following modules: Settler, Baffled reactor, Anaerobic filter, Planted gravel filter and Polishing pond. The treatment takes place by sedimentation, anaerobic degradation, sludge stabilisation and facultative degradation of organic matter followed by pathogen removal by ultra-violet radiation in the polishing pond.

The wastewater treatment plant is operated and maintained by the gardener of the hospital and his team who were trained for this task. A regular schedule is followed for maintenance, like checking sewer line systems, removal of sludge in settler, baffle reactor and anaerobic filter. In the planted gravel filter regular harvesting of plants is done. The filter media of both planted gravel filter and anaerobic filter is washed once in five years.

Outcome/Impact: Reduced load on fresh water (surface/groundwater) by using treated waste water for horticulture and irrigation purposes.

Key message: Waste water can be treated naturally to acceptable limits prescribed by Central Pollution Control Board (CPCB), and re-used for horticulture and irrigation purposes. Thus, stress on the freshwater can be reduced by significant levels

Hard facts: Construction cost of this system was INR 1.12 crore and annual O&M cost INR 0.03 crore.

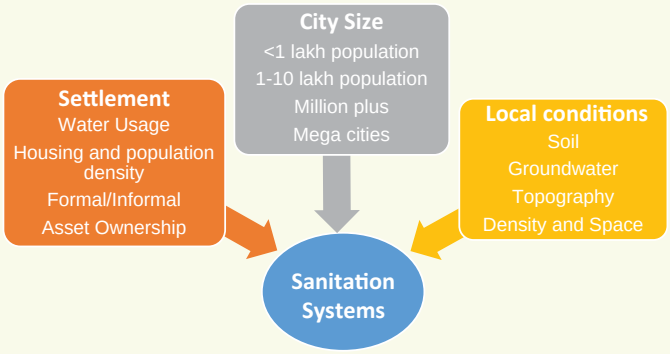
Further Details:
http://1.23.211.114/DBNSN/CDDProjectList.aspx | https://www.youtube.com/watch?v=zTqE-8j9Unw

DEWATS system maintains aesthetics of the campus

KEY FACTORS FOR SELECTION OF SANITATION SYSTEM

There are number of factors that need to be taken into account for the selection of an appropriate sanitation system for a city/town. These factors relate to the physical and socio-economical conditions of the city/ town. The most influencing factors are local physical conditions e.g. soil, groundwater, topography etc., size of the city/town and demographic conditions like population and settlements clusters (density, infrastructure, socio-economic class etc.).

Fig. 20 : Key factors for selecting sanitation systems



Local conditions

Physical conditions influence the most in terms of development of the sanitation systems. Following conditions will influence the planning and designing aspects for the sanitation systems.

Topography	Rugged and undulating terrain affects the overall economics of the sanitation projects. The infrastructure development costs (excavation, laying of pipe networks) and the recurring costs like pumping costs will be higher in hilly terrain compared to flat terrain. Natural gradient can be utilized by maintaining the gravity flow for the wastewater conveyance and deciding the location of STP by properly understanding the topography of the region.
Soil	The variety of soils (sand, clay, silt) and its characteristics like porosity, permeability, strength etc. determines pipeline layout plan and construction of underground civil structures. Soil thickness, compactness of ground (rocky strata or sandy) will affect overall construction cost. Soil permeability will influence construction/location of commonly constructed OSS like soak pits as high permeability is more preferred for construction of soak pits.
Groundwater level	Water table in the region affects the selection of suitable sanitation system. Depending on the ground water level it is decided how deep below the ground a sewer network can be laid.. For example the shallow water table can be easily polluted with leaking sewer or soak pits. Also, it leads to groundwater intrusion into sewer which increases water load at treatment plant and dilutes quality of wastewater. Deeper water table will be in favour of sanitation systems both centralized/decentralized as wells on site and off site. For example, OSS like soak pits can easily be constructed without threats of groundwater pollution.

City size

Size of the urban centre and its growth pattern is one of the crucial factors to decide suitable sanitation systems. Total population of city and its water demand highly influence the choice of sanitation systems which is sustainable and environmental friendly. There are approximately 8,000 town and cities as per Census of India 2011.

Currently in India, the peri-urban areas are observing rapid growth in most of the town and cities. Most of the core urban areas have already grown to their maximum capacities or are becoming non-affordable. Moreover, in terms of infrastructure availability the core city areas are generally covered with water supply and sanitation facilities. Additional infrastructure development becomes complex and demands huge investments in terms of time and money. Therefore, the existing limits of cities and its direction of growth become important to appropriately plan and design the sanitation systems.

Settlement

Type of settlement influences selection of urban sanitation systems. Some of its key considerations are as follows:

Water usage	The choice of sanitation systems should also consider quantity of water available and consumption pattern at household level. A centralized sewer system requires sufficient water to transport waste through sewers (100 lpcd of sewage flow as per CPHEEO). If sufficient water is not available, the centralized sewer system would not function well. In such conditions septic tanks and localized conveyance and treatment systems are more successful.
Formal / informal	In India, informal settlements are part of every city and town and cannot be ignored. The degree of their fomalisation varies. In notified category the sanitation system could be community toilets connected to sewer network as per standards. Creating sanitation infrastructure in informal settlements might require a different strategy altogether (e.g. property rights might not lie with the tenants, etc.).
Housing and population density	A centralized sewerage system is economically feasible in dense settlements. However if in dense settlements a sewerage system is not existing and technically not feasible (e.g. in historic downtown areas) then localized conveyance and treatment options (community septic tank, decentralized wastewater treatments) are recommended. In case of scattered population the infrastructure development cost will increase and therefore on-site/decentralized sanitation systems are more suitable.
Asset Ownership	Availability of land is prime requirement in sanitation system development. Legal status of land ownership needs to be clarified before any construction starts.

BEST PRACTICE IN AREA OF WASTE WATER MANAGEMENT WITH DECENTRALIZED WASTE WATER TREATMENT SYSTEM (DEWATS) AT BANKER'S COLONY, BHUJ, GUJARAT, INDIA

CASE EXAMPLE 4

Brief Description: The Banker's colony lies below the level of main sewer line passing nearby the area. Therefore, it was not possible to connect the sewer line of the colony to main line. To overcome this, the colony decided to construct the DEWATS and utilize the treated waste water to maintain the green belt in the colony area. With support from Bhuj Municipality, Hunarshala Foundation in association with Kachchh Navnirman Abhiyaan undertook this project to implement the system. Entire system is constructed in such a way that maximum space in the areas is utilized. The overflow from this system is diverted to the storm water drain and ultimately discharges into City Lake called Hamirsar located in the centre of the Bhuj city.

Outcome/Impact: Controlled discharge of waste water from colony which was otherwise not possible due to local topographical constraints has been achieved. Also, treated wastewater usage to maintain surrounding green belt area has been implemented.

Hard Facts: Total construction cost of the project in the year 2006 was INR 14-15 lakh with annual maintenance cost of INR 1-1.5 lakh. Treated water quality indicates 91 % reduction in BOD, 81 % in COD and 98 % in TDS.

Further Details:
https://www.flickr.com/photos/indiawaterportal/sets/72157603997548941/

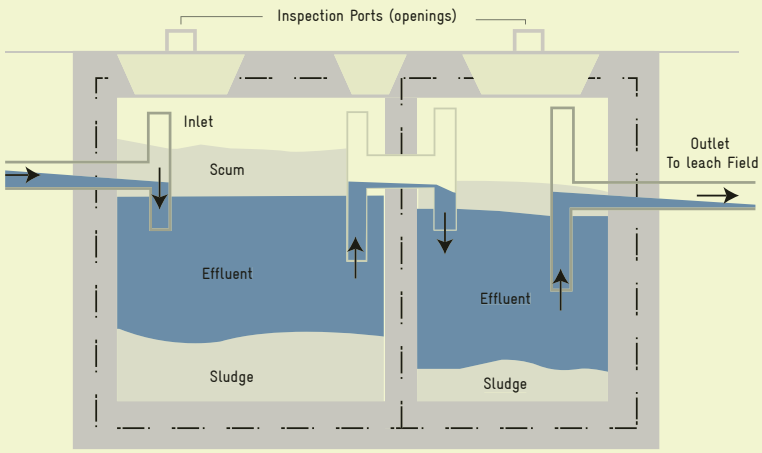
Flexible DEWAT modules accommodate as per the site conditions

II SEPTAGE MANAGEMENT

The term "Septage management" explains the process of managing on-site sanitation systems with stages of septage collection, transportation, treatment and disposal or recycle or reuse of its contents.

WHAT IS SEPTAGE?

'Septage' is a semi-solid material that is desludged / decanted from on-site sanitation system like septic tank (CSE policy paper, 2011). It has an offensive odour, appearance and contains significant levels of grease, grit, hair, debris and pathogens. Septage has three main components mentioned below:



Element	Definition
Scum	Floats on the top and generally consists of oil, grease and other fats
Effluent	Semi-treated liquid that comprises the major portion in the container (septic tank)
Sludge	Solid materials that settle down at the bottom of the container

The physical and chemical characteristics of septage depend on factors like size, design, desludging frequency, climatic conditions of a region and water quality. One of the important parameter that decide septage characteristics is type of food intake of population which varies in different parts of India. Septage with considerable amount of organic (Carbon) and nutrient (Phosphorous, Nitrogen) load, and pathogens disposed without treatment is a matter of concern. Septage in some cases can also contain varying amounts of micronutrients such as boron, copper, iron, manganese, molybdenum, and zinc (EPA, 2011). Septage can be a resource rather than a waste if properly managed. Septage can reduce reliance on chemical fertilizers and when combined with fertilizers can provide the required nutrients for crop production.

SEPTIC TANKS: MAJOR SOURCE OF SEPTAGE

Major part of urban India does not have a sewer system which makes people dependent on the individual or community septic tanks. A 'septic tank' can be defined as a tank or container with one inlet and one outlet that retains waste water and reduces its strength by settlement and anaerobic digestion of excreta. Septic tanks are generally designed for black water only. A well-managed septic tank will retain about 50-60% of the biological load in the wastewater, but it must be kept in mind that a septic tank is not a full-fledged treatment system. Hence effluent from septic tanks should be discharged to an on-site infiltration system (soak pit or drain field) or a small bore sewerage system, for further secondary treatment before discharge/reuse.

Septic tanks are designed for a time period (2 to 3 years generally), after which it needs desludging and disposal of septage to a treatment plant. This indicates that septic tank can only act as a part of the system and is not a standalone solution for a whole sanitation management system. BIS code [IS: 2470-1985] exist for planning and designing of septic tanks and provides all requirements that have to be met while

constructing a septic tank. The code ensures that the wastewater is treated in a way that maintains health and hygiene of the community (see Module 5 for details on IS codes).

Types of Septic Tanks

There are different types of septic tanks defined based on the number of chambers, intensity of treatment and complexity of the system.

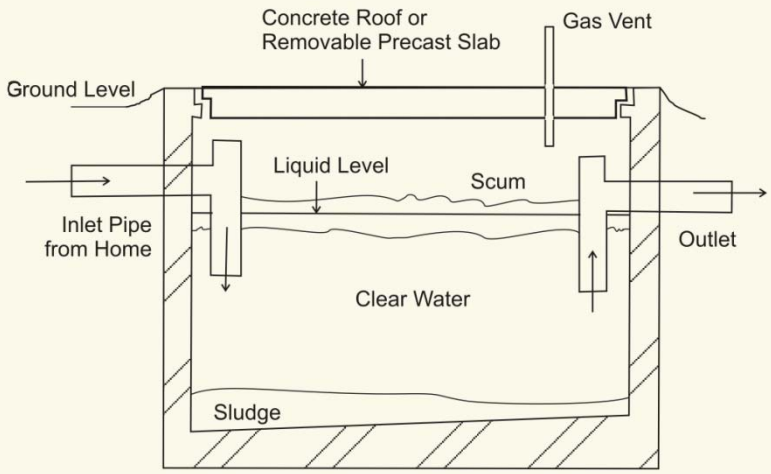
- CONVENTIONAL SYSTEM
  - a) Single chambered septic tank
  - b) Two/three chambered septic tank
- IMPROVED SYSTEM
  - a) Two chambered septic tank with filter
  - b) Anaerobic baffled reactor with filter

CONVENTIONAL SYSTEM

a) Single chambered septic tank

Settling of solids and anaerobic digestion takes place in a single chamber. Most of the single chambered septic tanks require frequent desludging as the rate of digestion of solids is comparatively low. It should be checked annually to ensure proper functioning. This conventional type of septic tank is not recommended as an on-site treatment system because of its low efficiency and high maintenance requirements.

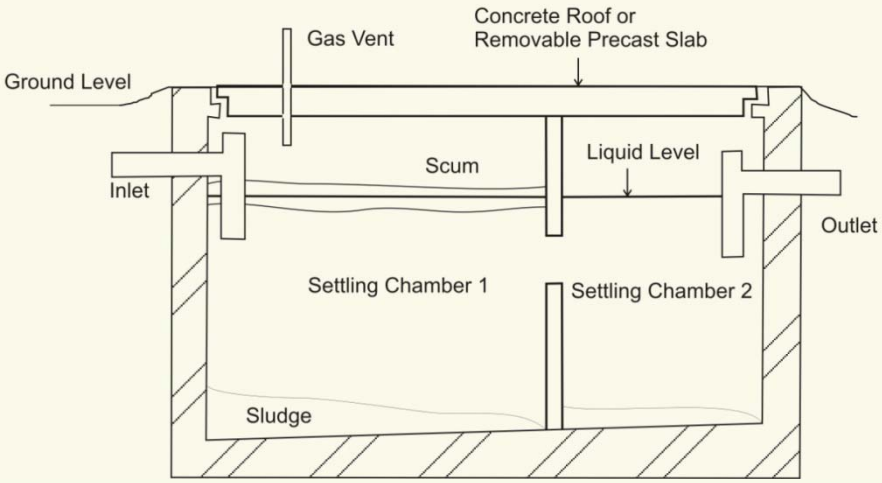
Fig. 21 : Single chambered septic tank



b) Two chambered septic tanks

This variety has two chambers where the first chamber should be at least twice the capacity of the first chamber or 2/3rd of the total length. Most of the solids settle out in the first chamber and the separation between the chambers is to prevent scum and solids from escaping with the effluent. A T-shaped outlet pipe will further reduce the scum and solids that are discharged. Generally, these septic tanks have to be emptied every 2 to 3 years.

Fig. 22 : Two chambered septic tank

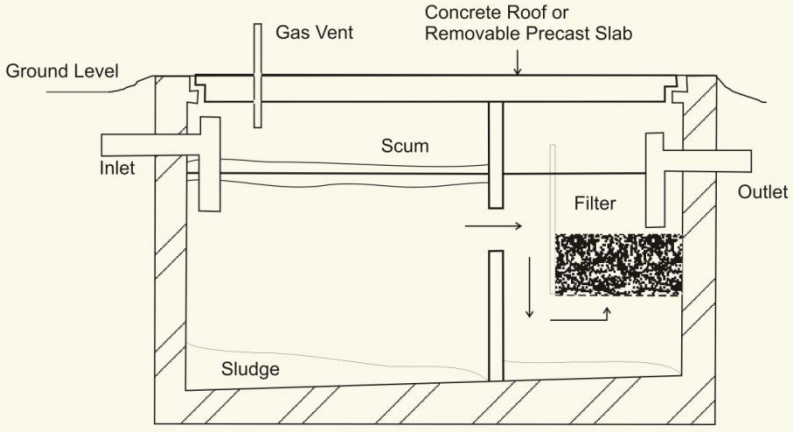


The removal of 50% of solids, 30 to 40 % of biochemical oxygen demand (BOD) and removal of *E.coli* can be expected in a well designed septic tank although efficiencies vary greatly depending on operation and maintenance and climatic conditions.

IMPROVED SYSTEM

a) Two chambered septic tank with filter

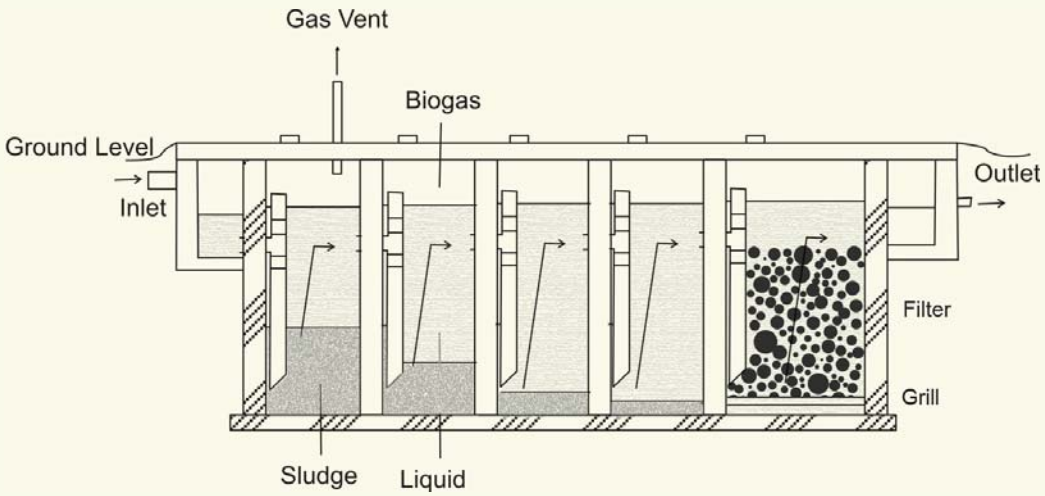
Fig. 23 : Two chambered septic tank with filter



This type of system incorporates two chambers with a single filtration chamber resulting in improved treatment. As wastewater flows through the filter, particles are trapped and organic matter is degraded by the active biomass that is attached to the surface of the filter material. Filter material commonly used includes gravel, crushed rocks, cinder or specially formed plastic pieces. Typical filter material sizes range from 12 to 55 mm in diameter. Ideally material will provide between 90 to 300m^2 of surface area per 1m^3 of reactor volume. By providing a large surface area for bacterial mass, there is increased contact between the organic matter and active biomass that effectively degrades it. Suspended solids and BOD removal can be as high as 85% to 90% but is typically between 50% and 80%. Nitrogen removal is limited and normally does not exceed 15% in terms of total nitrogen (TN).

b) Anaerobic Baffled Reactor with filter

Fig. 24 : Anaerobic baffle reactor with filter



An anaerobic baffled reactor with filter is an improved septic tank with a series of baffles under which wastewater is forced to flow. It incorporates one or more filtration chambers where particles are trapped and organic matter is degraded by the biomass that is attached to the filter media. BOD may be reduced by up to 90 %, which is far superior to that of a conventional septic tank.

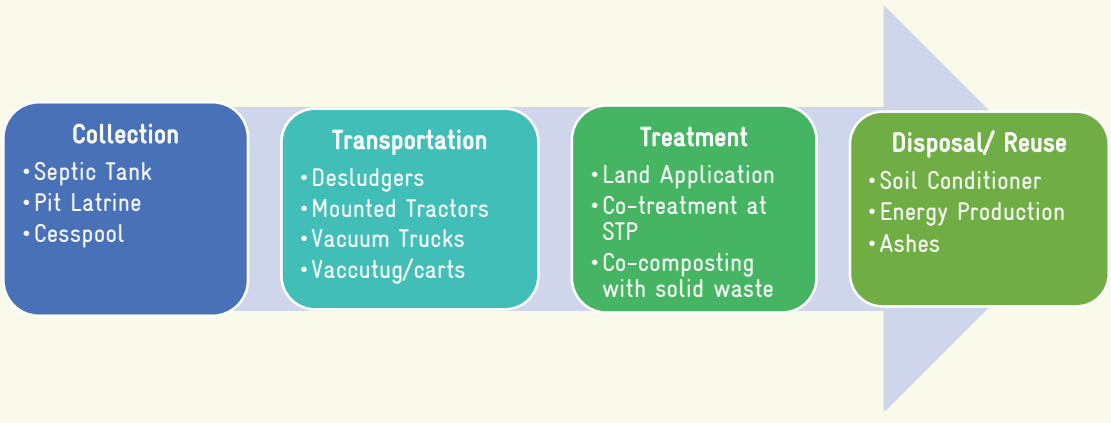
In practice the septic tanks are not made according to the IS code and hence the efficiency of the system is not good, it further affects the de-sludging time and the quality of effluent and septage emptied from these tanks.

STAGES OF SEPTAGE MANAGEMENT

Stages of Septage management involve collection, transportation, treatment and proper disposal/reuse of septage. Efficient septage management include safe disposal of both solid and liquid waste that overflow from the on-site sanitation system.

Following are stages of septage management:

Fig. 25 : Stages of septage management



Collection: It is safe removal of septage from on-site sanitation systems. In urban areas different situations prevail that facilitates or restricts collection of septage from septic tanks. There are a variety of OSS in urban/small towns and cities wherein the rate of septage generation will vary and thus influence the collection.

Transportation: It is taking septage from source to treatment facility. Most commonly in urban areas of India de-sludging trucks, mounted tractors; vacuum trucks are used to collect the septage. The size and design varies across India for transport vehicles and are mostly indigenously assembled. For inaccessible areas small sized vaccutug, are more convenient for de-sludging septage.

Fig. 26 : Variety of mechanical modes to desludge septic tanks

Source: Field visits, CSE Water Management Unit, 2014

Treatment: Septage can be treated in a variety of ways that is best suitable for the region. There are varieties of options that can be appropriately selected considering factors like cost and reuse possibilities. The quality and quantity of septage desludged from on-site systems also affects the selection of treatment option. Land application, co-treatment at STP, natural treatment options and dewatering and co-composting with solid waste are some of common and easily adaptable treatment options.

Disposal / reuse: The humus produced after composting can be used as a soil conditioner. Septage can also be used as an energy resource. There are some international and national examples where experiments have been conducted to generate energy from septage through incineration or pyrolysis.

WHY SEPTAGE MANAGEMENT?

Access to improved sanitation in urban India has increased, but on-site sanitation system management is yet to attain attention, despite increasing numbers of OSS like septic tanks. There are over 160 million on-site systems in Indian cities; there are no septage management programs or treatment facilities in the country (NUSP, 2008). Liquid waste from septic tanks overflows in most of the cases and enters low lying land or is diverted to nearby water bodies in many urban areas. This leads to serious health and environmental implications.

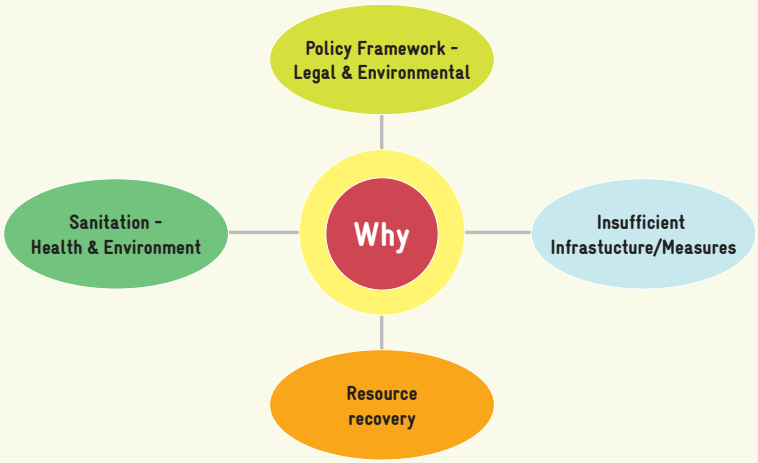
Septage Management is a new concept in India. There is no separate policy framework or regulation for septage management yet. However, there are national guidelines for urban areas and also several environmental regulatory provisions which prohibits unsafe disposal of domestic waste. States like Tamil Nadu[24] and Karnataka has taken initiatives towards septage management by issuing operative guidelines for Urban Local Bodies.

Development of sewerage infrastructure by government authorities in every corner of the city involves time, money, land and cooperation of other agencies and society. On the other hand the developmental activities are rapid in urban areas, by the time the authorities develop infrastructure, it has already grown in size both vertically and horizontally. As a stop gap arrangement the septic tanks at household or community level remain the only option. In absence of adequate provisions on safe disposal of septage its impacts on health and environment are adverse and affect overall sanitation of cities. Only through proper septage

24 http://www.tn.gov.in/virtual_directory/dtp/gorders/maws_e_106_2014_Ms.pdf

management, the septage can be re-used and added value within the sanitation system is achieved. Septage should also be managed as it is a statutory obligation for ULB to properly manage OSS to improve overall sanitation of the city. All four points are depicted in the figure below.

Fig. 27 : Need for septage management



Source: CSE-GIZ, 2015

Impact on Health and Environment

Presently in most of urban areas of India the septage disposal is unsafe which poses a threat to public health and the environment. Annually 37.7 million Indians are affected by waterborne diseases, about 1.5 million children are estimated to die of diarrhoea and around 73 million working days are lost due to water borne diseases[25]. Direct disposal of septage with high nutrient load into water bodies can cause eutrophication and affect dissolved oxygen level in water bodies. This can harm flora and fauna of water bodies. The percolation of contaminated water into groundwater can contaminate it. The consumption of contaminated groundwater is unhygienic and unhealthy

Statutory Environmental Obligations

The legislative framework in India has adequate provisions at national, state and city level to protect the environment. Public Health and Sanitation is a part of the 'constitutional responsibility' of the Municipalities under the 12th Schedule of the Constitution (74th CAA, 1992). Strengthening septage management by developing the enabling policies and physical infrastructure for septage collection, transport and treatment capacity can be an effective and practical solution to the problem. Though there are no specific legal provisions relating to the septage management, but there are a number of provisions relevant for sanitation services (as explained further in module 5).

All the current legal provisions dealing with diverse water, wastewater and sanitation services have resulted in multiple bodies and jurisdictions in India. However, septage management is not covered in a holistic manner except the prohibition of its discharge into water bodies.

Insufficient infrastructure / measures

In the rapidly developing urban areas, the infrastructure is difficult to develop at the same pace. This gap in development and infrastructure availability significantly damages health and environment until the

25 Drinking Water Quality: A Major Concern in Rural India (Some strategies towards cleaner water and the draft water policy-2012) - Saroj Gupta; BARNOLIPI - An Interdisciplinary Journal - Volume - I. Issue – VI. April 2012. ISSN 2249 – 2666

time sewerage infrastructure is in place. At the same time the OSS keep on growing which do not have any adequate provisions for safe handling. The gap keeps on increasing and never catches the pace of development. Hence septage management needs immediate attention in existing and new urban areas/cities and towns.

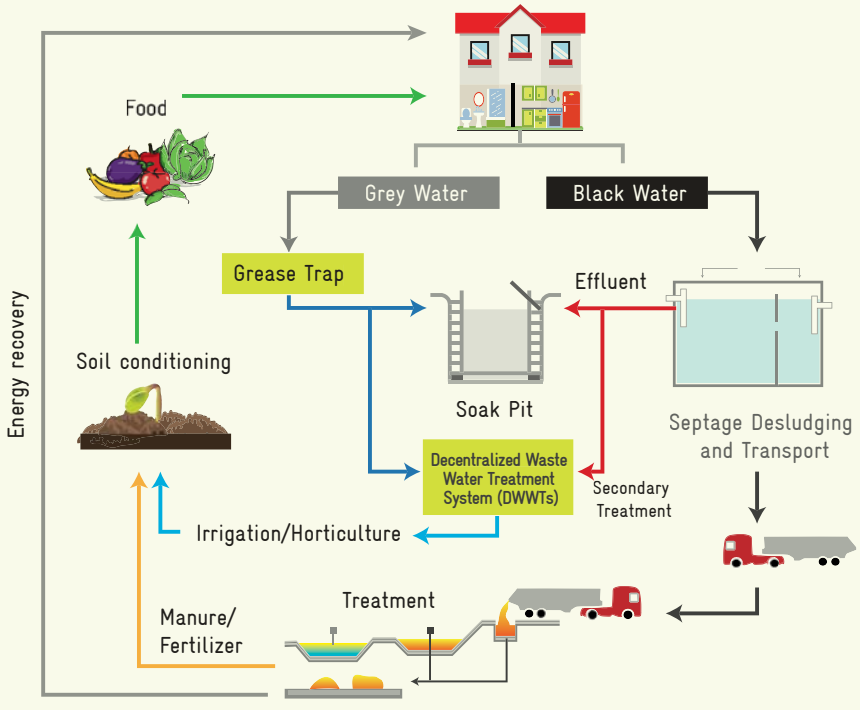
Septage as Resource

Appropriate management of septage can convert waste into a resource. It is already discussed that septage contains nutrients such as nitrogen, phosphorus and in some cases varying amounts of micronutrients such as boron, copper, iron, manganese, molybdenum and zinc (EPA, 2011). Urine has 90% of nitrogen, 50-60% of phosphorus and 50-80% of potassium which are very valuable for agricultural applications (Esrey et. al., 2001). Septage can reduce reliance on chemical fertilizers and in combination with fertilizers it provides the requirements of nutrients for crop production. In some experiments septage has also been used as an energy resource by generating energy through biogas system and bio-methanization process which can be used as fuel for cooking or for generation of electricity.

Septage Management Value Chain

The stages of septage management involve septage removal from generation sources to disposal or reuse of it. At the septage generation stage, if the grey water and black water are separated and treated independently, then it adds value to the entire septage management chain. Grey water after oil and grease removal can be treated in decentralized wastewater treatment systems and the treated waste water can be utilized for the irrigation /horticulture or other low end usage purposes. If there is no intention or need to reuse treated greywater, this water can be drained into a soakpit. It is a safe way of discharging it to the environment and recharging groundwater source. Septage from septic tank can be de-sludged using de-sludging equipments and can be transported at the septage treatment facility. After the treatment it can be used as soil conditioner/manure for agricultural as the chemical fertilizer costs are increasing with time and for energy generation.

Fig. 28 : Septage value chain



ISSUES IN SEPTAGE MANAGEMENT

Septage management is the vital aspect in the planning of urban sanitation. The issues associated with septage management with respect to urban sanitation system can be summarized as follows:

a) *Construction of OSS* – Septic tank is most common OSS in India. There are standards and guidelines provided by national agencies (BIS & CPHEEO) to construct efficient septic tanks. However, in most parts of the country local knowledge (of contractors) is used to construct the septic tanks which do not follow prescribed standards. Instead of only black water, grey water is also diverted from the household to the septic tank. This leads to improper/inefficient functioning of the septic tanks.

b) *Operation and Maintenance* – In most of urban areas information about O&M for existing OSS is poor. This includes lack of periodic desludging, lack of occupational health and safety practices, etc. Moreover, there are areas where accessibility is also an issue to desludge septage. In most cities the desludging is done by private parties with unskilled labours. The lack of awareness among the workers also affects O&M aspects. People also do not desludge the septic tanks at regular interval unless it is necessity for them.

c) *Regulations* – Weak enforcement of rules and regulation is one of the issues in septage management. There are no specific policies except few indicative guidelines.

d) *Health and Environment* – Unsafe disposal of septage into open areas drains or water bodies without any treatment harms environment (surface/groundwater) and public health.

THE WAY FORWARD

To successfully implement septage management in urban areas following actions are required:

Community participation

- Awareness campaigns: Adverse impacts of poor septage handling needs to be conveyed through effective IEC in communities. Local NGOs can be involved in this process.
- Behavioural Change- Promoting mechanisms to bring about and sustain behavioural changes aimed at adoption of healthy sanitation practices.
- Knowledge about OSS and the need to regularly desludge on-site systems should be conveyed.
- Household level care in O&M to reduce sludge can be communicated by Do's and Don'ts.

Enforcement of Rules & Regulations

- Establish effective bye laws for on-site sanitation and septage management in city
- Establish regular monitoring through task forces in the city
- Enforce the follow up of the waste discharge standards set by regulatory bodies

Retrofitting/Construction of OSS as per standards

- Information about existing OSS status in city through primary surveys
- Retrofitting of faulty OSS through appropriate approach by stakeholder consultation
- Construction of new OSS as per standards and guidelines

Operation and Maintenance

- Design of Standard Operating Procedures (SOPs) for the operation and maintenance of OSS
- Sustainable operator model
- Establish routine/cycles of regular desludging of the OSS in city

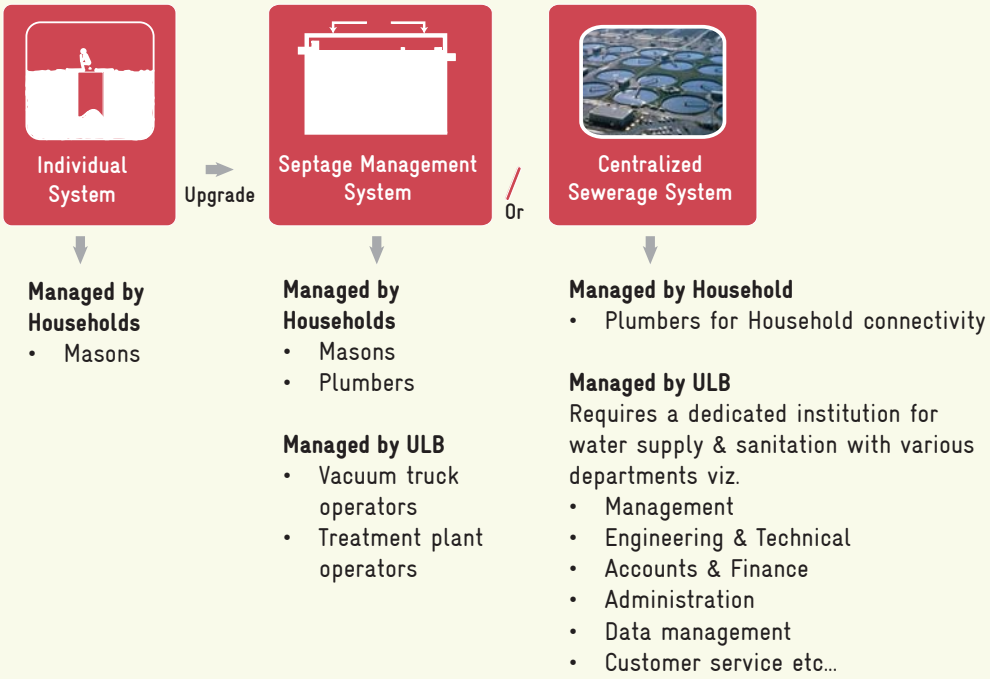
- Training/Orientation programme for local masons, private operators to impart knowledge on septage management and seeking their cooperation in it.

INSTITUTION/HUMAN RESOURCE REQUIRED FOR IMPROVED SANITATION

Upgradation of individual sanitation systems to septage management system or centralized sewerage system is a more than a mere technical step. In this, it will need different actors with different capacities to develop the sanitation systems. The requirements for institutional and individual capacities increase and become more complex according to the system in place. Any ULB needs to assess their capacities before selecting a sanitation solution.

Required institutional and human resources requirements from individual systems to the upgraded centralized sewerage system are given as follows:

Fig. 29 : Human resources required for sanitation systems



KEY MESSAGES FROM MODULE 3

1) There is no standardized solution applicable to each city in a 'blueprint fashion'. The sanitation system has to be 'hand-tailored' for each city.

2) Decentralized systems, when planned and designed adequately can complement centralized systems well.

3) On-site Sanitation Systems are and will be prevalent in Indian cities. Cities will never be fully healthy and sanitized without safe handling of the generated septage.

4) Septage can be converted into a valuable resources, such as energy and nutrients.

MODULE 04

HOW TO TRANSLATE CSP INTO ACTION?

LEARNING OBJECTIVES

- To know methods for detailed planning of projects emerging from City Sanitation Plans and for prioritizing and phasing of projects to translate the CSP into action.
- To create awareness about the importance and mode of stakeholder participation in the preparation and implementation of CSP.

The path from planning to implementation is often a difficult one. While technical detailing of a plan itself is a considerable task, the social and environmental implications of the activities make the process further complex. Hence the process of translation of CSP recommendations into concrete actions is an incremental process involving prioritising of the recommendations, phasing and detailed planning of projects and involvement of stakeholders. This module details this whole process covering the tools and strategies which can be used by the ULB implementing team.

I CITY SANITATION PLAN (CSP) AND DETAILED PROJECT REPORT (DPR)

Once the CSP is ready, it is time to plan and implement specific interventions that are in line with the strategies defined in the CSP for the immediate, short, medium and long term. The interventions are not only the construction of infrastructure, but also the carrying out of programmes for the strengthening of institutions, capacity development, awareness generation and behavioural change, developing monitoring and evaluation systems, among other. Following points are worth noting:

- CSP is the vision document for understanding the status, needs and priorities in the sanitation sector (and other related sectors) of a city.
- It serves as a plan which covers all relevant issues from water supply, toilet access, wastewater management, storm water management, solid waste management, etc.
- Being a comprehensive document, it lists and prioritises the projects which are identified as important to improve the sanitation situation in the respective city.
- It serves as a broad investment plan and underlines the identified sources of finances. A CSP is developed with active stakeholder engagement organized through a City Sanitation Task Force to establish acceptance and visibility of sanitation planning among various communities.

The CSP does not, however, go into the detailed project planning. The translation of the prioritized projects in the CSP into detailed implementation planning should be the first step after the finalization of the plan. One tool for managing implementation is the Detailed Project Report (DPR), which is relevant especially for investment projects.

A DPR is the executive document based on which implementation of specific project happens. It essentially contains the detailed designs (drawings), cost estimates and other specifications for the identified projects. A DPR involves limited engagement of the stakeholders and will only cover the details of the planned activities. A DPR is a tool introduced by the Government of India to access financial support for implementing concrete projects.

II CITY SANITATION PLAN – FROM PLAN TO IMPLEMENTATION

For each investment project, the city administration should go through a series of steps. The whole series of steps for a thorough project planning are described below (Fig 30):

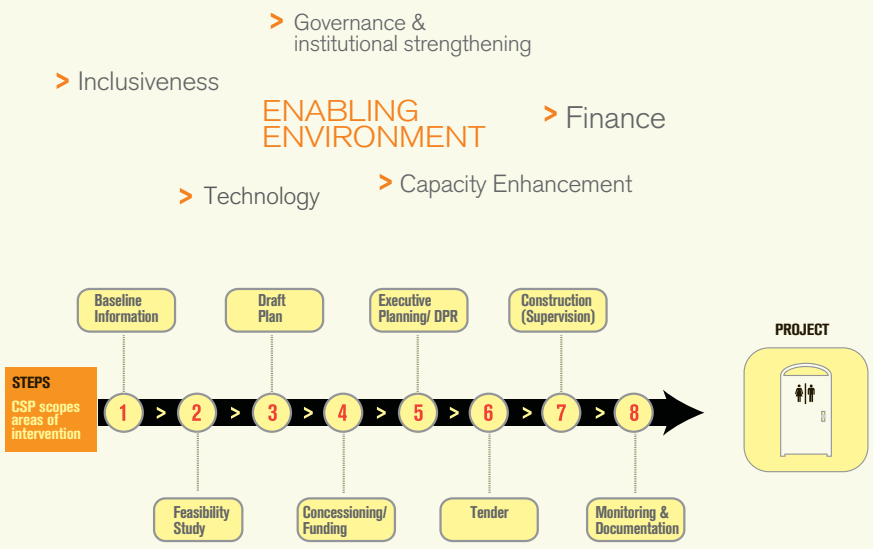
1. **Baseline Information**

   Relevant spatial and non-spatial data on existing status of the area of interest needs to be generated using primary or secondary sources. It is often observed that information required for designing an intervention is recorded by different agencies or service providers and hence the generation of baseline requires synergic action from different governmental and non governmental bodies.

2. **Feasibility Study**

   A feasibility study does an evaluation and analysis of the potential of a proposed project and should form the basis for any further decision making. Ideally the study assesses if the project is technically, financially, socially, legally, environmentally and institutionally feasible by examining different options.

Fig. 30 : Suggestions for stepwise process of project implementation



3. **Draft Plan**

   A draft plan, also called Preparatory Project Plan (PPR) explains the technical solution detailing the design, initial drawings, legal and land requirements, preventive measures for public litigation, and cost estimates. This would give a clear idea on the costs and timelines for this solution.

4. **Concessioning and Funding**

   In this step all the required concessions identified in the draft plan need to be obtained and funding options for covering the cost estimates of specific options need to be explored. Mobilizing of funds is a key step in the process and requires prompt action from the implementing agency.

5. **DPR**

   The draft plan (if formulated) will then be translated into the format of a Detailed Project Report. The DPR involves comprehensive and complete description of the technology solution and its implementation plan. It includes detailed technical drawings, designs, cost estimates and work plans. A comprehensive plan for Operation and Maintenance including financial requirements also forms part of the DPR as well as a business plan and a procurement strategy to prepare for the tender.

6. **Tender**

   Tendering process enables transparent selection of competitive contractors for implementation of the desired action. The implementing agency needs to ensure technical and financial capabilities of the selected body and the process must be accepted by stakeholders. The procurement process has to be implemented in a transparent way and in many cases market building for finding suitable bidders has to precede the tender process.

7. **Construction**

   During the stage of construction, the implementing body is required to supervise the process for the quality of the work and adherence to the time schedule. Controlling of budgets from escalations and timely completion and commissioning of the project also requires involvement of the planning department. The construction stage often involved detailed planning and is normally organised through a project management consultant (especially for larger projects).

8. **Monitoring & Documentation**

   Post implementation monitoring and documentation of the project helps in understanding the effectiveness of the action.

III PHASING OF CSP

The CSP recommendations, as they are variable in size, impact and urgency, need to be carried out in a phased manner to match the funding and manpower available with the city administration. Phasing of projects not only ensures that the needs of citizens are met in a logical order but it also increases the chances of implementation since the capacities of the ULB are not over strained. The activities can be phased to the following segments:

IMMEDIATE & SHORT TERM – UP TO FIVE YEARS

Immediate and urgent improvements of sanitation services have to be carried out in the initial years after the CSP is made. The recommendations which comparatively need lesser funding and time to realise and still have a strong direct impact in the lives of residents are classified in the short term phase. Infrastructure development projects like septage management, improving O & M of existing facilities, toilet construction, awareness generation, public sanitation facilities, etc can be classified in the short term activities list. Along with these planning for preparations for medium & long term plans, establishing monitoring mechanism, improving budgetary allocations, data management of existing facilities are also immediate/short term actions. Implementing these actions will provide the ULB with some "quick wins" that make improvement of sanitation services for citizen visible and enhance their trust.

MEDIUM TERM – UP TO FIFTEEN YEARS

Recommendations that have significant impact, that need more elaborate planning steps and require substantial funding support are planned as medium term actions. These projects are expected to be realised in the next 5-15 years as considerable time is required in planning, detailed engineering and financing. These are usually projects like building of new sewerage system, new drainage system, treatment facilities and augmentations for growing populations. Activities intended in building sustainability of the systems by integration of different aspects of sanitation are also planned in this timeframe. The overall aim would be to provide adequate facilities and infrastructure support for the residents in this time period.

LONG TERM- UP TO THIRTY YEARS

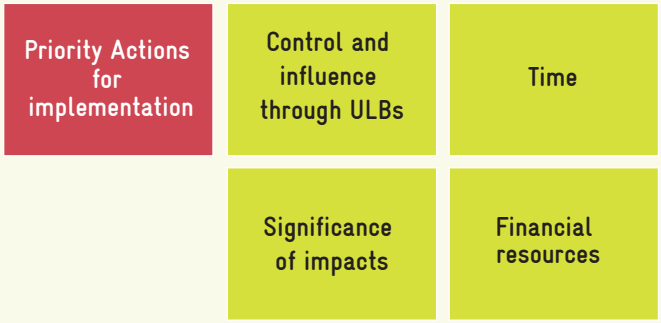
Long term recommendations focus on ensuring sustainable functioning of sanitation services and adaptation of the system towards future developments. This includes integrating all sanitation infrastructures, provisions for population growth, review of plans and actions, building sustainable and environment friendly infrastructure and achieving benchmarks. In effect the development of the city as a fully sanitised one is ensured within this time frame.

Capacity building of the stakeholders needs to be carried out as an ongoing activity throughout. This ensures an enabling environment for the planning process which supports sustainable and successful running of the activities.

IV PRIORITIZING ACTIONS

Categorizing and prioritizing proposed actions by ULB and CSTF into short, medium and long-term actions need to follow transparent and relevant criteria. Criteria for helping with this task are the following enlisted in Fig. 31:

Fig. 31 : Factors affecting priority actions



Prioritising of individual projects is done by taking into consideration financial resources, time, impacts and ULBs control over the action.

- Time refers to the time frame that is required for a selected action.
- Financial resources means the availability of own funds of ULB or the access to external financing from public or private bodies as well as the amount of investment required. There might be even actions that can be implemented without additional capital investment such as awareness campaigns, restructuring of institutions or capacity development activities.

SIGNIFICANCE OF IMPACTS

The significance of impacts of the planned activity plays an important role in the prioritising of it. For e.g.: provision of toilets in an area which doesn't have any accessible toilet infrastructure can make a strong impact for the residents and the environment in that area. Depending on the probable number of users and the demand for toilet in that area, the action would have a significant impact in the sanitation situation in that part of the city. The adverse impacts of the existing conditions, which are the consequences that happen if a certain improvement is not implemented, also play an important role in prioritising the activity. There can be significant adverse impacts on the city due to:

- Wide spread open defecation and / or urination
- Improper / no O & M of existing infrastructures like drains, or toilets (open discharge)
- Lack of septage management
- Direct discharge of untreated sewage into water bodies
- No storm water management system – flooding, pollution
- No treatment facilities available
- Lack of system for grey water management

Recommendations that cater to issues like these need to be listed as top priority as those actions can deliver direct benefits of strong impact.

CONTROL AND INFLUENCE THROUGH ULBS

ULBs play the main role in coordinating the implementation of actions. Therefore actions, which can be directly controlled and influenced by the ULB will have a higher rate of successful implementation. The

dependence on other actors, which could cause time delays, cost escalation or deviation from project goals, is far less. These activities include a range of actions such as --

- Management of public sanitation facilities
- Management of O & M of existing facilities
- Establishment of effective septage management system
- Establishment of monitoring mechanisms (for households)
- Sanitation related By-laws
- IEC activities – School sanitation & use of facilities
- Empowering communities to construct individual toilets
- Involvement of private sector, communities in maintenance, services provisions (outsourcing)

All these actions are relatively easy to implement and enforce and there already exists an institutional mechanism to enable the same. In some cases prioritising these actions would help in building an enabling environment by introducing a proper institutional mechanism, financial or legal structures for realising the further recommendations. These activities can be carried out earlier than the high impact processes as the time and financial requirements of these are relatively less.

V PLANNING AND MANAGING THE SANITATION SECTOR: A MULTI-STAKEHOLDER TASK

For the development of the CSP as well as the implementation of sanitation services in a city a broad range of stakeholders can and should be involved, as long as the responsibility for coordination is clearly defined. The range of relevant stakeholders for the sanitation sector includes:

- Central and State government
- Relevant departments of the ULB
- NGOs
- State Parastatals and Pollution Control Board
- Academic and Research Institutions
- Private Services Providers
- Technical consultants
- Community-based organisations and self-help groups

For project implementation they can be involved according to their expertise and available resources. For the preparation and implementation of the CSP itself those actors should form part of the City Sanitation Task Force (CSTF) steering the CSP process. Therefore the CSTF becomes a particularly important stakeholder in the sanitation sector.

The objective of forming the CSTF is to have a multi-stakeholder institution at city level to achieve the goals of NUSP and to mobilize joint actions from different public and non-government agencies. Through the CSTF it should be ensured that the process of CSP preparation and implementation is of high quality, takes into account all relevant perspectives and focuses on outputs.

The main responsibilities of CST are:

- Providing overall guidance to the ULB
- Approving progress reports provided by the ULB
- Approving of CSP (prepared by ULB) after consultation with citizens
- Supervise progress regularly
- Issue briefing about the progress to media & state government
- Generating awareness amongst city's citizens and stakeholders
- Recommend to the ULB fixing of responsibilities for city-wide sanitation on a permanent basis

VI DRIVERS OF CSP IMPLEMENTATION

The involvement of various stakeholders and the outsourcing of full projects or project parts to external agencies require strong coordination. The ULB needs to sit in the driving seat steering the process. This does not mean that the ULB has to implement each step of the process. External private companies, external technical experts, state departments, NGOs or self-help groups can be brought on board for executing selected tasks (e.g. development of feasibility study, operation and maintenance, etc.).

According to the complexity of the project and the size of the town the ULB needs to put in place the required institutional structure. In case of an upgrading of pit latrines to septic tanks, a selected team of staff members can manage the process. For example, if a broader septage management system fitting within the overall city-wide sanitation system is envisaged, a dedicated department in the ULB might be required. In case of a centralized sewage system with sewerage and septage treatment facilities and water re-use option, an independent & self-sustaining Water and Sanitation Utility is recommended to have departments ranging from administration, technical coordination and financial management.

VII THE IMPORTANCE OF STAKEHOLDER PARTICIPATION

Involving different stakeholders representing all sectors of the community in the CSP preparation and the management of the sanitation sector is not only important because it is required by the NUSP, but also because stakeholder participation will lead to improved results in sanitation service delivery, because -

- Sanitation is a shared responsibility: It starts with the practices of the individuals in the household and goes until the operation of a treatment plant by the ULB or a private operator. Each actor has to contribute through their behavior for a successful process and outcome;
- Hygiene and sanitation related behavior is much more likely to change if community is actively involved in awareness generation or even the design or operation and maintenance of sanitation facilities;
- Participation of stakeholders creates ownership for sanitation services and will improve the sense of responsibility among all actors involved;
- The information base for taking decisions will be significantly larger by involving stakeholders from different sectors of society. A better understanding of the ground situation can be achieved;
- Participation is the most effective way of communicating information on which the strategy is based, its goals and tasks to be undertaken;

- Participation by stakeholder groups is critical for decision making. The result will be a realistic strategy with a broad base of knowledge, understanding and commitment from the groups involved;
- Participation shall strengthen civil society and democracy, mobilize people for active involvement in governance;
- Finally all the above mentioned reasons will increase the efficiency and effectiveness of investments.

GUIDING PRINCIPLES FOR STAKEHOLDER ENGAGEMENT

Build confidence –

While interacting with stakeholders, planners must ensure respectful collaboration. Individual partner inputs must be taken seriously and it has to be made visible how their contributions are reflected in the outcomes. This helps in building confidence among stakeholders in the ULB and the project activities.

Ensure to reach the community –

The project must look attractive. The value additions made by the project for the community must be visible. The needs and the intended societal benefits form a strong force in the acceptability of the project. Motivation and bringing together excluded or reluctant parties makes the project more inclusive and acceptable for the community.

Involve stakeholders actively in problem identification and solution –

Stakeholder involvement in problem identification and solution development helps in bringing different perspectives on a challenge and the most appropriate solution for the same. Involving stakeholders at different steps raises their understanding for the issue, builds their capacities and makes communication of the following action to the public easier.

Include stakeholders in implementation and success stories –

Even after the implementation, stakeholder involvement in success stories and follow up activities is essential in building trust and ownership of the community over the project.

Public Information, Education and Communication –

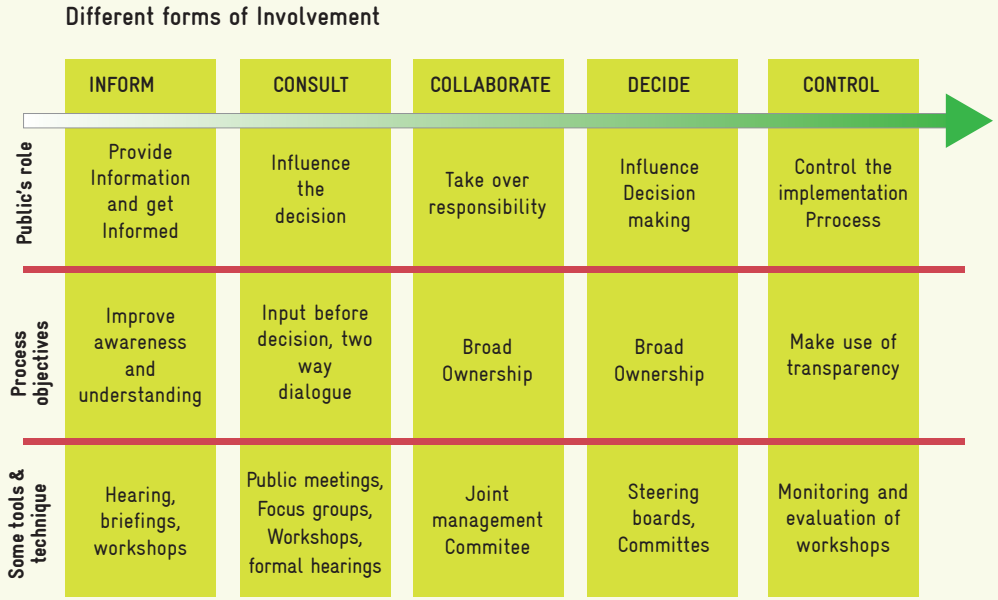
Offering maximum awareness and outreach opportunities ensures effective communication and capacity building of the stakeholders.

STAKEHOLDER PARTICIPATION MATRIX

Not every relevant stakeholder for sanitation in a city has to necessarily form part of the City Sanitation Task Force. First it is important to understand, what they can contribute and which level of involvement would therefore be adequate. For some stakeholders it might be sufficient to provide regular information updates, others need to be proactively involved in the decision making process

A stakeholder participation matrix (see Figure 32) is a simple tabular arrangement of stakeholders with respect to their involvement in the project. It helps the ULB to decide how, when and where to involve the respective stakeholder and which information to share.

Fig. 32 : Stakeholder participation matrix



Inform

To provide stakeholder(s) with information on project goals, objectives and to enable people to understand the problem, alternatives and/or solution. This helps in improving awareness. Public hearings, briefings and workshops can be organised to involve those stakeholders who need to be just informed about the activities.

Consult

To obtain stakeholder's feedback on analysis, alternatives and/or decisions. It involves acknowledging concerns and providing feedback on how stakeholder's input has influenced the decision. Public meetings, focus group discussions, etc. are common tools for consultation.

Collaborate

To work as a partner with stakeholder(s) on different aspect of decision making, including the development of alternatives and the identification of the preferred solution. This can ensure sharing of responsibilities and build broad ownership of the projects among people. Involving stakeholders in advisory committees and management committees help in making this collaborative effort.

Decide

Stakeholders are empowered to (co)decide on planning steps, strategies and implementation of activities. This builds a sense of ownership among the stakeholders. The level of involvement is higher here and the stakeholders form a part of the steering committees and boards.

Control / Empower

Stakeholders take over or share the responsibility for the implementation of a certain project / the CSP. They will be in charge of monitoring and evaluation of the process and the results.

INNOVATIVE COMMUNITY INVOLVEMENT IN PPP MODEL TO IMPLEMENT AN UNDERGROUND SEWERAGE SYSTEM, ALANDUR MUNICIPALITY

CASE EXAMPLE 5

Brief Description: Alandur is part of the Kanchipuram district of Tamil Nadu and forms a part of the Chennai Metropolitan Development Area (CMDA). The town has been reported to have a population of roughly 165,000 (Census 2011) people of which approximately one-fourth lives in slums. Recognising the need for a centralised sewerage system in the city but lacking the funds to pay for it, Alandur municipality initiated an innovative public-private financing scheme which encouraged the local population to contribute to construction and operation costs through connection and service provider fees and in this way the Alandur Sewerage Project (ASP) was the first project in the municipal water sector to be undertaken through the Public Private Partnership (PPP) route in India in partnership with the state asset management company Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) and USAID's Financial Institutions Reform and Expansion (FIRE) Project.

Before implementation of the project a 'willingness to pay' survey was conducted on 10% of the population to check their assent to pay 150 INR as maintenance fees initially, and later to be extended to 180 INR. Public Awareness Campaigns and Collection centres for citizens seeking to receive the connections were organized on a large scale and this helped it become a successful multi-stakeholder project involving the municipal authorities, the private sector, community-based organizations and, most significantly, the people themselves.

Outcome / Impacts: The Alandur sewerage project is a unique case of public participation in financing of municipal infrastructure which was taken up as a whole on a BOQ (Bill of Quantities) basis, and construction of the sewerage treatment plant (STP) was done on a BOT (Build, Operate and Transfer) basis due to the absence of financial and technical capacity at the municipal level. Approximately, 29% of the project cost was garnered from public contribution which far exceeded expectations and allowed a functional underground sewerage system to be created in the city through genuine and effective public participation. About 120 km of branch and main sewers have been laid, and a BOT operated Sewage Treatment Plant has been completed. The replacement of septic tanks has led to a reduction in the contamination of storm water drains and the underground sewerage system has eliminated the breeding grounds for mosquitoes thereby reducing the risk of related health impacts to the citizens.

Description: The project manifests a well- thought, transparent and well-researched approach. To ensure effective participation of the local population it was decided to collect deposits from at least 10,000 residents before calling for tenders and by the end of May 2000, more than 13,000 connection seekers (domestic and non domestic) had deposited the one time connection fee to the municipality. Further, as part of another initiative, care was also taken to ensure that the poorest people, who could not afford private sewerage facilities, were not left out. Provision had been made for community toilets for these segments. People who were unable to pay the deposits on their own were given the option of loans from local banks on nominal interest rates. While special provisions were not made for waiving fees for the poor, plans did include the connection of public latrines to the sewer system. The construction of community toilets was taken up on demand from slum dwellers and hence helped extend sanitation services to the poorest segment of the population who could not afford the non-refundable deposit and were therefore not connected to the system.

Key Messages: A well-thought, transparent and well-researched inclusive approach inculcating participation of the poorest of the poor through loan grants to slum dwellers and priority connection of public latrines to sewer system, has contributed immensely to the success of the project.

Further Reading: http://rtichennai.cag.gov.in/rti-website/rti-chennai/download/CaseStudyPPP.pdf or contact: ecosan@ecosanservices.org

KEY MESSAGES FROM MODULE 4

1) The CSP implementation requires a stepwise plan prioritising actions according to financial resources, time resources, relevance of impacts and scope of action of ULBs.

2) Involvement of relevant stakeholders is required at different stages of preparation and implementation of CSPs. This makes the solutions acceptable by the public, coherent with other requirements and sustainable.

MODULE 05

ENABLING ENVIRONMENT FOR IMPLEMENTATION OF CSP

LEARNING OBJECTIVE

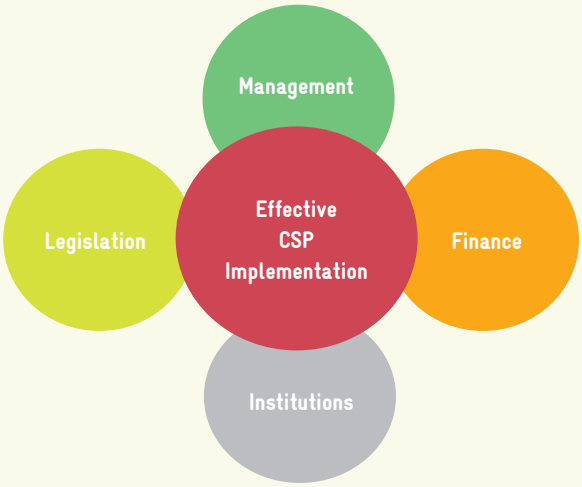
To understand the various pillars that contribute to an enabling environment for the implementation of the CSP, namely, legislative framework, institutional framework, process management and financial management

The successful implementation of the CSP and sanitation services delivery needs more than technical solutions. An enabling environment consisting of an adequate legislative framework, functional institutions, a clear management and sustainable financing needs to be put in place or if already existing, requires strengthening. This module explains how various supporting factors can lead to successful implementation of the CSP and overall sanitation services delivery.

SUPPORTING FACTORS FOR EFFECTIVE CSP IMPLEMENTATION

The experience of implementation of sanitation solutions all over India has shown that the best technical solution cannot be sustainably implemented if there is no strong institution to ensure operation and maintenance, if there are no regulation mechanisms and if there is no financial management system to back it up. Therefore following aspects shown in Fig. 33 have been identified as constituting an enabling environment for CSP preparation and implementation:

Fig. 33 : Supporting factors for effective CSP implementation



I SUPPORTING FACTOR: LEGISLATIVE FRAMEWORKS AND STANDARDS FOR URBAN SANITATION

Public Health and Sanitation is part of the constitutional responsibility of Municipalities under the 12th Schedule of the Constitution (74th Constitutional Amendment Act, 1992). Still there are legislative frameworks and standards at all three governance levels – centre, state, cities which need to be followed:

NATIONAL LEGISLATIVE INSTRUMENTS

The Water (Prevention and Control of Pollution) Act 1974 and Formation of Pollution Control Boards

- Objective:

  Prevention and control of water pollution and the maintaining or restoring of wholesomeness of water.

- Main provisions:

  The Act makes a **constitutional provision** for the formation of pollution control regulation boards, namely the **Central Pollution Control Board** (**CPCB**) along with the corresponding **State Pollution Control Boards** (**SPCB**). However, experience suggests that although the Act has been substantially successful in curbing the evils of Industrial pollution, domestic / household pollution is not regulated in the same manner.

The Environment Protection Act 1986

- Objective:

  Umbrella legislation for protection and improvement of environment.

- Main Provisions:

  Under the act the central government is authorized to -

  – set new national standards for ambient quality of the environment and standards for controlling emissions and effluent discharges;

  – regulate industrial locations;

  – prescribe procedures for managing hazardous substances;

  – establish safeguard for preventing accidents;

  – collect and disseminate information regarding environmental pollution.

  The 1993 amendment to the Act lays down the national norms and standards for treated water quality with parameters like pH, turbidity and BOD. This Act applies in principle to every establishment, agency, or individual discharging any pollutant into the environment. In principle, the ULBs are required to comply with discharge norms for wastewater released from sewage treatment plants.

The National Building Code 2005

- Objective:

  The Bureau of Indian Standards under the recommendations of the Planning Commission formulated the National Building Code in 1970 to unify the scattered rules and provisions with respect to building construction.

- Main Provisions:

  – The Code contains regulations which can be immediately adopted or enacted for use by various departments, municipal administrations and public bodies.

  – The Code also covers regulation for ventilation, acoustics and plumbing services, such as, water supply, drainage, sanitation and gas supply.

  – The Code covers the basic requirements of water supply for residential, business and other types of buildings, including traffic terminal stations.

  – The Code also covers general requirements of plumbing connected to public water supply and design of water supply systems.

  – It covers the design, layout, construction and maintenance of drains for foul water, surface water, sub-soil water and sewage; together with all ancillary works, such as connections, manholes and inspection chambers used within the building and the connection from the building to a public sewer, private sewer, individual sewage-disposal system, cess-pool, soakaway or to other approved points of disposal / treatment work. It includes the provisions for solid waste management.

The Manual Scavenging Act 2013: Legislation in search of dignity

Source: http://s1.firstpost.in/wp-content/uploads/2013/09/manual-scavenging_afp.jpg

Manual scavenging refers to the practice of manually cleaning, carrying, disposing or handling in any manner, human excreta from dry latrines and sewers. It often involves using the most basic of tools such as buckets, brooms and baskets.

- Objective:

  Recognizing that manual scavenging is violating the right to dignity, the Act aims at prohibition of employment of persons as manual scavengers and rehabilitation of existing manual scavengers.

- Main Provisions:

  In 2013, the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993 was amended. The previous act prohibited the employment of manual scavengers for manually cleaning dry latrines and also the construction of dry toilets, that is, toilets that do not operate with a flush. It provided for imprisonment of upto a year and a fine.

  The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013, is wider in scope and importantly, has acknowledged the urgency of rehabilitating manual scavengers. Key features of the Act include:

  – Prohibition of the construction or maintenance of insanitary toilets
  – Prohibition of the engagement or employment of anyone as a manual scavenger
  – Violations could result in a years' imprisonment or a fine of INR 50,000 or both
  – Prohibits a person from being engaged or employed for hazardous cleaning of a sewer or a septic tank
  – Offences under the Act are cognizable and non-bailable
  – Calls for a survey of manual scavengers in urban and rural areas within a time bound framework

BREAKING FREE: REHABILITATING MANUAL SCAVENGERS (UNITED NATIONS IN INDIA)

DID YOU KNOW

According to the India Census 2011, there are more than 2.6 million dry latrines in the country. There are around 1.31 million toilets where human excreta is flushed in open drains, 794,390 dry latrines where the human excreta is cleaned manually. 73% of these are in rural areas and 27% are in urban areas.

There are **750,000** families that still work as manual scavengers. Most live in Uttar Pradesh, Rajasthan, Bihar, Madhya Pradesh, Gujarat and Jammu and Kashmir. Many states openly deny the existence of such workers. Activists working for the community estimate the number to be higher, around 1.3 million, especially because railway employees cleaning excrements from the railway tracks have not been included.

STATE LEGISLATIVE INSTRUMENTS

State Municipal Acts

As sanitation is a state subject, various states have come up with their own legal instruments either in the form of State Municipal Acts or Policy measures considering state specific situations. The Haryana Municipal Corporation Act, 1994; Gujarat Irrigation and Drainage Act, 2013; Karnataka Urban Drinking Water and Sanitation Policy, 2003 etc. are some examples for such legal instruments. Presented below in Table 8 are components of urban sanitation which can be regulated by a Municipal Act supplemented with an example from Karnataka:

Table 8: Regulations imposed through Municipality Acts

Regulation		Examples[27]
	Power to close open discharge	Provisions can be made to vest power in the Commissioner to direct by order that the open discharge of waste water be permanently or temporarily closed if it appears that the same is necessary to prevent injury or danger to the health of persons.
	Disconnection of Services	The Commissioner may be provided with the power to order private drains to be closed, discontinued or destroyed and that any work necessary for that purpose be done if in his opinion the drains are not adapted to the general system of the Municipal area. Provision can also be made to ensure such orders are not passed without making necessary alternative provisions.
	Work to be done only by licensed plumbers	Provisions can be made to ensure that all the work carried out by the ULB pertaining to water supply, drainage and sewage disposal is done by certified plumbers. In cases, discretion may be given to the Commissioner to permit employment of non-licensed plumbers if he thinks that the work is of a rather simple nature.
	Protection of misuse of public sewers / infrastructure through construction of roads	Provisions can be made to ensure that without the written permission of the Commissioner no railway or private street, shall be constructed and no building, wall, fence or other structure shall be erected on any municipal drain or on any waterworks constructed or maintained by or vested in the Corporation.
	Grant permission to cross private land for water / sanitation connectivity	If it appears to the Commissioner that the only or most convenient means of water supply and drainage is placing, or carrying any pipe or drain over, under, along or across the immovable property of another person, the Commissioner may, by order in writing, authorize the owner of the premises to place or carry such pipe or drain over, under, along or across such immovable property. Further provisions can ensure that no other legal right over property of such other person will be accrued through such an order.

26 Adopted from Haryana Municipality Act, 1994 and Himachal Pradesh Municipal Corporation Act, 1994

₹	Tariff fixation, collection	Provisions can be made to impose sewerage tax for commercial buildings. Also, provisions can be made to impose water taxes on buildings to which a water supply is furnished, or which are connected by means of pipes with municipal water works, or which are situated in any portion of the Municipal area in which the Commissioner has given public notice that sufficient water is available for a reasonable supply to all the lands and buildings in the said portion.

Karnataka Municipalities Act, 1964

- All the powers and functions of the Urban Local Bodies in Karnataka with respect to drainage, water works etc. are laid out categorically from section 193 to section 207 of the Act which include management, construction, inspection, fine-levying provisions etc.
- Constructing, altering, cleaning and maintaining sewers and drainage networks is obligatory duty of the municipality.
- Before construction of any new building, the interested person must notify the municipality about information required by the bye-laws or demanded by the municipal council regarding the limits, dimension, design, ventilation and materials of the proposed building, and the intended situation and construction of the drains, sewers, privies, water-closets and cesspools and must obtain permission regarding the same.

Other similar legal instruments which govern sanitation services include **Building Rules notified by the State Government under the provisions of a specific Act empowering them to do so,** for e.g. The West Bengal Municipal (Building) Rules, 2007[27].

Main provisions of the Act include:

- The act provides that the planning, design, construction and installation of water supply, drainage and sanitation etc. shall be in accordance with the provisions of Water Supply, Drainage and Sanitation, Gas Supply or Plumbing Services, of the latest edition of National Building Code of India.
- Construction of other facilities like bathrooms, kitchen, water closets etc. is subject to provision of sewer line supply.
- Conditions on construction of septic tanks along with dimensions have been outlined.
- The provisions such as location of sewer lines, submission of sewer and water supply plans for sanction, inspection of sewer lines etc. have been allotted to the municipal authority.

CITY LEGISLATIVE INSTRUMENTS

Municipal By-law

Municipal by-laws are a form of delegated legislation which enables local bodies to discharge their functions more effectively and typically include, for example, a requirement for property owners to discharge wastewater without causing nuisance; and an obligation to discharge wastewater into sewers where available. The by-laws have to adhere to the Municipal Act and must be notified by the State Government for implementation. Some typical by-laws at the city level are noted below:

- Reuse and recycling of treated wastewater –

  Some subsidies, rebate on property tax etc. can be given for reusing and recycling treated wastewater. *For e.g. Rajkot: In August 2009, the Municipal Corporation amended building bye laws, making recycling and reuse of waste water mandatory. The use of potable domestic water for non-potable uses like car washing,*

27 Source: http://www.wbdma.gov.in/PDF/The%20WB%20Municipal%20_Building_%20Rules,%202007.pdf. (Accessed On: 09-02-15)

gardening, construction purposes, landscaping, irrigation uses is forbidden by virtue of powers vested with government.

- Dual Water Supply systems –

  Implementation of dual water supply system in all new layouts and apartment complexes can be made mandatory in the city. *For e.g. in Bengaluru[28] : The builders of over 30 new apartment complexes coming up in and around the city have been asked to install dual lines for potable and recycled water reusing water for construction activities.*

- By–laws for construction of septic tanks as per standards -

  Municipal by-laws can mandate that septic tanks are constructed in strict compliance with national norms and standards and can additionally prescribe the distance, location and accessibility of the septic tank with respect to the settlement. *For e.g. in Haryana: The Haryana Municipal Drainage and Sanitation by-laws, 1977 mandate that the design and construction of the septic tank must be in accordance with Indian Standards prescribed in I.S. 2470.*

- By–laws for penalty provisions

  Provisions can be for imposing penal sanctions of whoever contravenes and fails to comply with the requisitions made under the bye-laws. *For e.g. in Delhi: the Delhi Cleanliness and Sanitation By-laws, 2009 provide for fines for offenders or additional sanctions like community service to be imposed on defaulters by the appropriate authority for contravening the provisions of the By-laws. These provisions cover littering, urinating, defecating in the open, discharge of waste etc.*

WASTE WATER REUSE BYELAW BY RAJKOT MUNICIPAL CORPORATION

CASE EXAMPLE 6

Brief Description: Rajkot city is located in Gujarat state of India. It lies in water deficit region without perennial water source and limited possibilities to exploit groundwater. Local water sources (water bodies) in the city were also polluted. Considering the water scarcity and other water related issues in the city, Rajkot Municipal Corporation (RMC) in the year 2008, as a part of the local control development enacted a byelaw for all applicable buildings. ICLEI, SA supported this initiative.

As per the law all the buildings will require treating 100 percent of grey water and would be allowed to discharge only if not utilized for flushing toilet, watering gardens and washing cars. The special provision in the byelaws was to provide separate collection pipes for the grey water, separate treated tank for the treated grey water by maintaining the water quality standards as per the Gujarat State Pollution Control Board (GPCB). ICLEI, SA supported construction of small scale non-mechanized treatment plants in 140 residential household complexes.

Outcome/Impact: Significant reduction in the energy consumption was observed in RMC.

Hard Facts: The estimates for the individual pilot project indicate water saving of 130KL/HH/year with annual cost saving of INR 435. The same when projected for the city comes to around annual reduction of 325,000 KL of water and cost saving of INR 0.9 million.

Further Details:
http://urbanclimateproject.iclei.org/pdfs-for-events/D%20H%20Brahmbhatt.pdf
http://urbanclimateproject.iclei.org/PDFs%20for%20initiatives/Waste%20Water%20Reuse%20Byelaws%202009.pdf

28 Centre for Science and Environment. 2011. Policy paper on Septage Management in India. New Delhi, India.

NORMS AND STANDARDS FOR URBAN SANITATION

The central, state and municipal legal instruments lay down the broad policies and decide the mode of implementation of the same in their different capacities. These legal instruments must conform with the norms, regulations and standards laid down from time to time by various statutory bodies like the Central Pollution Control Board and the respective State Pollution Control boards. Some typical examples of norms and standards have been enlisted below:

Table 9: Important Norms and Standards in the water and sanitation sector

Standard	Implementing / Managing Authority	Examples
Discharge Standards for treated wastewater	CPCB	Rules prescribed under the Environmental protection Act, 1986 Schedule VI A include specific standards for a range of parameters with respect to discharge of waste water / effluent. The standards include those for colour, pH, BOD, COD, level of contaminant metals etc.
Standards for construction of septic tanks	IS codes	IS 2470 (Part 1):1985 – Code of Practice for installation of septic tank: design criteria and construction. IS 2470 (Part 2):1985 – Code of Practice for installation of septic tank: secondary treatment and disposal of septic tank effluent.
Standards for water quality	CPCB	The CPCB prescribes specific standards according to the categories for e.g. Drinking water, Water for Bathing, Water for irrigation industrial cooling etc.
Standards for construction of community / public toilets	CPHEEO	Public toilets to be constructed every 1 km, including in parks, plaza, open air theatre, swimming area, car parks, fuel stations. Toilets shall be disabled-friendly and in 50-50 ratio (Male / Female).
Standards for per capita water supply	CPHEEO	The recommended standards for cities provided with piped water supply where sewerage system exists or is contemplated is 150 lpcd for metropolitan and mega cities and 135 lpcd for other size class of urban centers. However, irrespective of the size class, all urban centers provided with piped water supply where no sewerage system exists or is envisaged, the recommended norm is 70 lpcd.
Guidelines and manual on wastewater, solid waste, storm water etc.	CPHEEO	As per the guidelines given in manual of sewerage and sewage treatment by CPHEEO, sewage generation has been estimated at 80% of water supply. For urban drainage system, the coefficient of runoff may be calculated for areas with composite land use pattern on the basis of anticipated land use in the new areas and existing land use pattern for the areas already developed. In urban area, runoff coefficient not less than 0.6 may be adopted in absence of adequate details of the areas
Laboratory protocols and standards	CPCB	The Drinking Water Quality Monitoring protocol describes specific requirements for monitoring drinking water quality ensuring provision of safe drinking water to the consumers. It also includes requirements for setting-up laboratories at State, District and Sub-district level and their quality control for regular testing and surveillance of drinking water sources.
Service Level Benchmarks (SLB's)	MoUD, Government of India	SLB framework encompasses 28 performance indicators across four sectors water supply services, sewerage management (sewerage and sanitation), storm water drainage, solid waste management (SWM) services. According to SLB framework, cities have to present their own performance data along with a performance gap analysis and improvement plans.

SEPTAGE MANAGEMENT GUIDELINES IN TAMIL NADU

CASE EXAMPLE 7

Brief Description: The state of Tamil Nadu as part of Vision Tamil Nadu 2023 – Strategic Plan for Infrastructure Development aims at providing the best infrastructure services in India in terms of universal access to water & sanitation services among others. For this they have identified septage management as one of the crucial areas of intervention since 55% of urban population is relying on septic tanks, which are often not designed nor emptied properly. Therefore the Department of Municipal Administrations and Water Supply of Tamil Nadu has issued Operative Guidelines for Septage Management for Local Bodies, one of the first states to do so. These guidelines cover all elements of the septage management cycle, such as Design and Construction of Septic Tanks, Septic Tank Pumping & Desludging, Septage Transportation, Treatment & Septage Disposal, Fees/Charges for Collection, Information, Education and Communication, Record-keeping and Reporting (MIS).

It not only specifies design requirements for septic tanks, but also provides template Septage Transporter Permits since generally existing operators desludging septic tanks and transporting and disposing septage are working informally without any regulations and monitoring. The document still requires further strengthening, but it is a strong first step for the regulation and prioritization of septage management in urban areas.

Outcome / Impact: The envisaged outcome when implementing these guidelines, which were only issued in 2014, is a significant improvement in the functioning of septic tanks as well as a reduction of open discharge of septage into water bodies and open areas.

Further Details: http://www.tniuscbe.org/download/go/go1904.pdf

II SUPPORTING FACTOR: INSTITUTIONAL FRAMEWORK FOR URBAN SANITATION

PRESENT INSTITUTIONAL SET-UP FOR WATER SERVICES DELIVERY IN THE COUNTRY

Today, there are several institutions which are involved in the provision of urban water supply and sanitation services. These include the state public health and engineering departments (PHEDs), specialized state Water Supply and Sewerage boards, specialized city-level boards, municipal corporations, and other urban local bodies. Different states in India show varying institutional arrangements involving single or multiple institutions for water supply and sanitation service provision as seen in Figure 34 below:

Fig. 34 : Different institutional set-ups for water and sanitation service delivery in the country

Urban local body as the service provider and creator of capital assets	City level parastatal as the service provider and creator of capital assets	State level parastatal as the service provider and creator of capital assets
Andhra Pradesh	Bangalore	Haryana
Maharashtra	Chennai	Rajasthan
Gujarat	Delhi	Uttar Pradesh
Madhya Pradesh	Hyderabad	Odisha

Some states have been experimenting with different institutional models for service delivery even before the passage of the 74th CAA. The experimentation ranges from strengthening the ULB model of service provision with transfer of asset to the ULB to creation of parastatal at the city or state level. Currently there are five different institutional models.

ULB Model

Under this model, all the functional responsibilities of water supply and sanitation service provision are handled by the ULB. Such model exists in the states Gujarat, Madhya Pradesh, Maharashtra (in 225 of the 250 ULBs), Andhra Pradesh (except Hyderabad), Tamil Nadu (except Chennai), West Bengal and Karnataka (in 5 of the 215 urban local bodies in the state). In the state of Haryana, Faridabad is the only city in which the local government provides water supply and sanitation services. Overall, this model serves about 45% of the urban population in the country.

City-level Parastatal Model

Under this model, all the functional responsibilities of water supply and sanitation service provision are handled by a specially established authority at city / metropolitan area level. This institutional arrangement is present in most metro cities like Bangalore, Hyderabad, Delhi and Chennai and these authorities are established by a separate act. Examples of city-level parastatals are Delhi Jal Board, the Bangalore Water Supply and Sewerage Board (BWSSB) etc.

State-level Parastatal Model

Similar to the City Level Parastatal, a State-level parastatal is a specially established authority which is providing water supply and sanitation services in more than one city of one state. The examples of such entities are the Kerala Water Authority (KWA) and Maharashtra Jeevan Pradhikaran (MJP). Most of these entities are in charge of asset creation and operation and maintenance.

Public Heath Engineering Department (PHED) Model

Under this model, all the functional responsibilities of providing water supply and sanitation services are handled by Public Health Engineering Department (PHED) or a Public Works Department (PWD) or any other department of State Government. Such a kind of arrangement is present in the states of Assam, Uttar Pradesh, Orissa, Bihar, Rajasthan, Goa, Punjab and Haryana (except Faridabad).

Multiple Institutions Model

In some cases, there is a bifurcation of responsibilities between the parastatal and the ULB. The parastatal undertakes the task of creating the assets which are then handed over to the ULB for operation and maintenance. For instance, Karnataka Urban Water Supply and Drainage Board (KUWSDB), a state level parastatal established by the Karnataka Urban Water Supply and Drainage Board Act, 1973, is responsible for all the capital works i.e. for planning and executing the schemes for water supply and drainage in all the urban areas in Karnataka state. However, the board does not provide services to the municipal corporations of Mysore, Bijapur, Shimoga, Tumkur, and Bangalore. In 1995, the Karnataka State Government transferred the O&M functions from KUWSDB to the respective ULBs while KUWSDB retained the asset creation responsibility.

Each model has evolved over a period of time and some models such as parastatals were introduced for achieving structural changes and improved services delivery. Still most of them lack the internal capacity for efficient service delivery as well as the autonomy of decision making. Coupled to weak financial acumen this presents a substantial challenge for water and sanitation service delivery today. Most institutions have no internal or external mechanisms for review, thus directly affecting their accountability. There are a few

key issues which can be identified with each type of model. For e.g. in the ULB-level model no mechanism exists to make the ULB's accountable for service delivery; in the City-level parastatal model financing framework is ad-hoc and not linked to performance delivery and the State Government which to is make the Boards accountable is itself a member on the boards (except BWSSB) in an apparent conflict of interest. In the PHED model, besides lack of financial sustainability, the department is the sole agency in performing the functions which are required in service delivery and are often conflicting with each other.

Various states having varied service delivery models or a combination of those and they have not been able to avoid the pitfalls involved. The result is numerous utilities, play out at the city level and converging their roles and duties to affix responsibility becomes a tedious task, as described in Fig. 35 in case of Kochi:

Fig. 35 : Suggested organisational chart for Kochi

Urban Services	Planning	Implementation	O&M	User charges (who is collecting)
Water Supply	KWA	KWA	KWA	KWA
		Cochin Port Trust		Cochin Port Trust
Sewerage	KWA	KWA	KWA	KWA
	KSUDP	KMC	Cochin Port Trust	
	KMC	Cochin Port Trust		
Septage Management	KSUDP	KSUDP	Private Operators	KMC
	Suchwita Mission	Suchwita Mission		
	Cochin Port Trust	KMC		
	KMC	Cochin Port Trust		
Storm Water Drainage	KSUDP	KSUDP	Kerala PWD	
	Kerala PWD	Kerala PWD	KMC	
	KMC	KMC		
SWM	KSUDP	KSUDP	Kudumbashree	Kudumbashree
	Suchwita Mission	Suchwita Mission	KMC	RWA
	KMC		RWA	
	Clean Kerala Campaign	KMC	CREDAI	CREDAI
Public Toilets	KMC	KMC	Private Operators	KMC
	GCDA	GCDA		GCDA

None of these models, as the study indicates, has been able to serve as a one-stop solution to the woes of the water and sanitation sector. The argument therefore is not to prefer one model over another, but to ensure that whichever model of service delivery exists, be in conformity with the ingredients of efficient institutional models identified above.

REQUIREMENTS FOR A FUNCTIONING WATER AND SANITATION UTILITY

Although the 74th CAA became the trigger for empowerment of ULBs in some cases this has not necessarily resulted in improved services or enhanced financial sustainability especially with respect to the water and sanitation sector. There is no single entity in India involved in the provision of water and sanitation services which performs at the levels indicated in the Service Level Benchmarks as instituted by Ministry of Urban Development, Government of India (MoUD) as seen in Table 10 below.

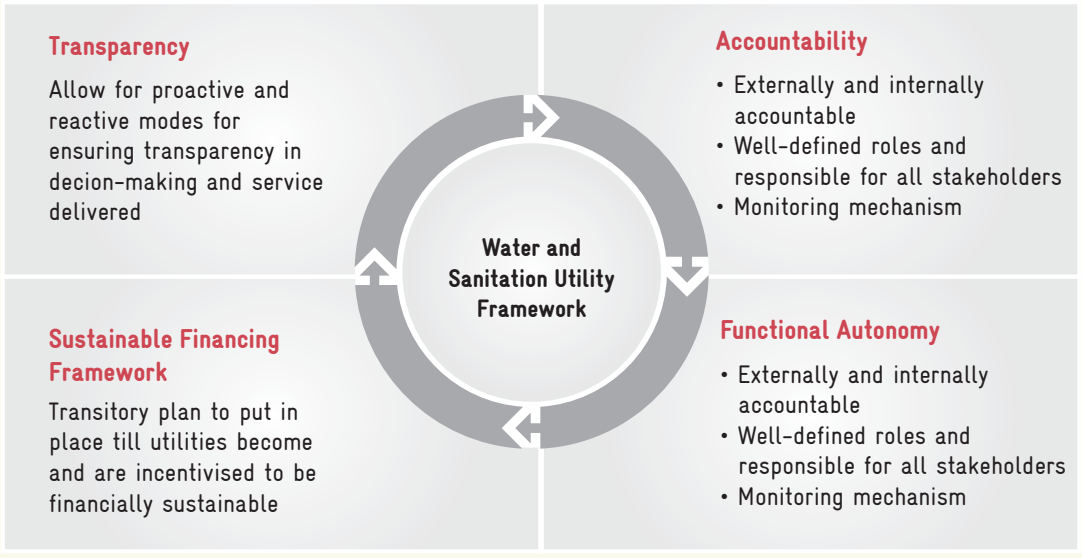
Table 10 : Performance assessment of ULB-WSS utilities as per the Service Level Benchmarking Framework

SLB indicator – Water Supply	Maha-rashtra – Municipal Councils	Maharashtra Municipal Corporations except Mumbai	Gujarat	Mumbai	Chattisgarh	MP
Household level coverage, %	66	75.9	76.5	100	24.6	44.8
Per capita quantum of water supplied, lpcd	77.9	115.5	96.7	135	45.2	56.9
Extent of metering of water connections, %	11.9,	32.1	1.6	81	1.2	0.3
Extent of NRW, %	23.1	32.3	15.7	18	64.6	45.1
Continuity of water supply (hrs/day)	2.2	2.8	2	2.5	3	1.1
Quality of water supplied, %	87.7	94.7	81.8	99	62.9	69.1
Efficiency in redressal of customer complaints, %	70.1	74.2	69.2	60	74.1	73.6
Cost recovery, %	62.2	76.1	49	100	24.4	24.5
Efficiency in collection of water charges, %	69.2	69.9	57.4	80	42.6	53.1

There are several reasons attributable to the above statistics. With respect to the ULB – model, State Governments have empowered ULBs to revise tariffs but have retained control over certain functions in service delivery. First of all the ULBs do not have the power to recruit new staff or create new positions. They need the approval from the State Government. Administrative structures and amount of work at state departments might slow down such approval process. Another fundamental issue on staffing is the tenure of key personnel at the ULB level. There is no fixed tenure for Commissioner and other key positions. In the absence of a fixed and sufficiently long tenure for key positions, no long-term strategic planning can be undertaken.

It is thus the need of the day to have strong water and sanitation utilities with all relevant functions under a single head, especially in case of complex sanitation systems. Certain important institutional reforms would be required in this respect. At the same time they need to be empowered to provide the services. The State Government needs to put in place a sustainable and predictable financing arrangement for the service provider to operate. This is essential as the service providers will continue to require funding support from the State Government till the operations become financially sustainable. For creating well-functioning institutions, the following ingredients shown in Figure 36 are required:

Fig. 36 : Ideal Water and Sanitation Utility – Strengthening components



The four ingredients of the Indian Water and Sanitation Utility Framework[29] together and not alone will provide necessary conditions for the sector to perform better.

Ingredient I – Accountability

The water and sanitation service providers need to be made accountable to both external and internal stakeholders. Internal accountability looks at how management and staff are held accountable for effectiveness (the degree to which the utility realizes its goals) and efficiency (the cost effectiveness of resources used to produce its services). Indicators highlighting internal accountability in a utility include: responsiveness of the chief executive to the board; whether performance targets are well defined; whether staff are subject to annual performance evaluations; and whether the staff are also incentivised for achieving performance targets; and whether the staff are trained to perform well.

Ingredient II – Transparency

Transparency initiatives refer to any attempts to place information or processes that were previously opaque in the public domain, accessible for citizen groups, providers or policy makers. Initiatives for transparency can be proactive or reactive disclosure by public agencies. The enactment of the Public Disclosure Law and the Service Level Benchmarking framework provides a good source of information on the level of services provided. The Right to Information Act allows citizens to proactively seek information on various issues from the service providers.

Ingredient III – Financial framework

The service provider should have: 1) Separate budgets and accounts for water supply and sewerage services & 2) Accrual based accounting systems. The cost of the inefficiencies should not be passed on the consumers in terms of higher tariffs. Thus, the cost of efficient service delivery needs to be determined.

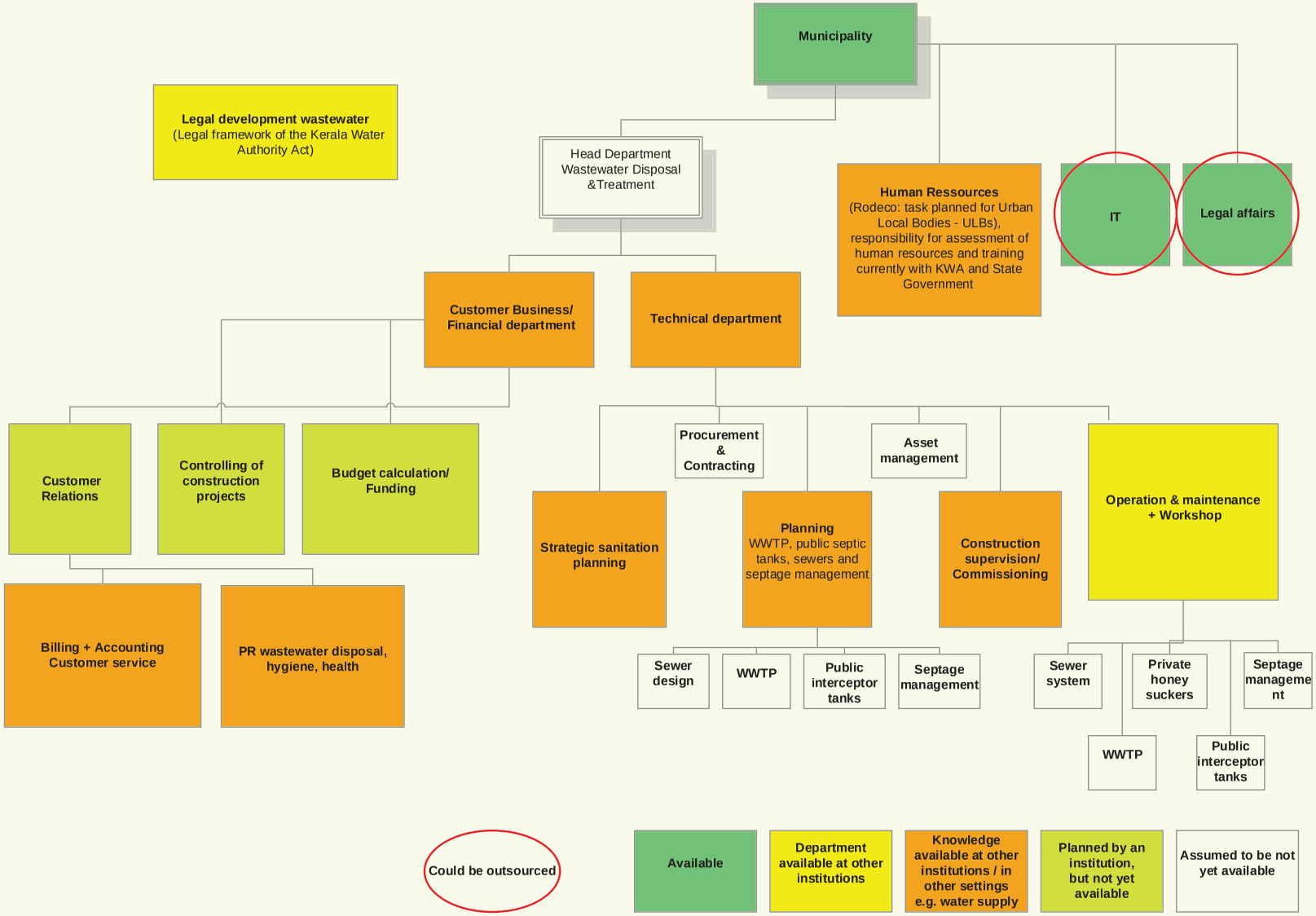
Ingredient IV – Functional Autonomy

The functional autonomy refers to independence from external interference in key decisions which include ability to propose a justifiable tariff structure to meet their revenue requirements, ability to provide incentives to staff for better performance, ability to borrow from commercial sources including banks and capital markets among others.

For the city of Kochi, a study on a potential wastewater utility was conducted by CRISIL Risk and Infrastructure Solutions Limited and HAMBURG WASSER. Based on German experience, they developed a model for efficient management of the wastewater services for the city of Kochi. The figure below shows the organisational chart.

29 Adapted from Indian Water Utility 2020, GIZ (2014)

Fig. 37 : Suggested organisational chart for Kochi

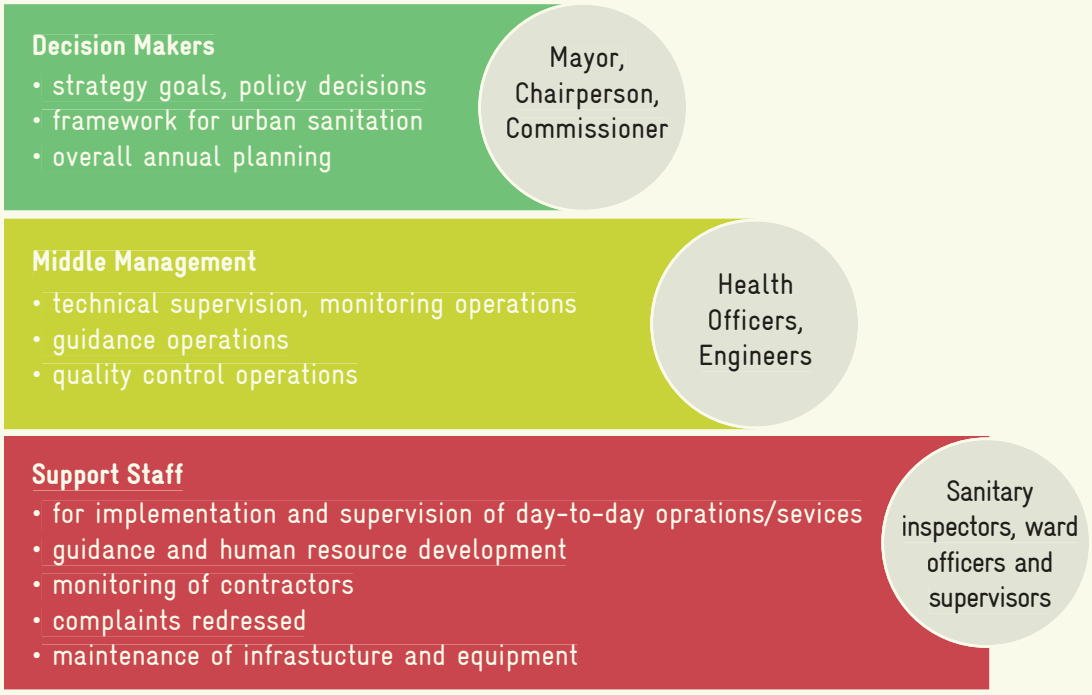


III SUPPORTING FACTOR: MANAGEMENT

LEVELS OF MANAGEMENT

Establishing an institution is not the final step. It furthermore needs an adequate management structure and well-defined processes such as information management, human resource management, contract management and infrastructure management with clear distribution of roles and responsibilities. An institutional structure includes decision makers, middle management and support staff as described in Fig 38.

Fig. 38 : Different Levels of Management at institutional level



INFORMATION MANAGEMENT

The volume, complexity and criticality of data in just about every organisation – public and private sector – is expanding and it is very important to start improving information management at the ULB-level in order to do effective planning and implementation. Information management is of the main managerial processes for effective functioning of institutions and better service delivery.

Information Management includes -

- data management through various sources,
- provision of information to the public preferably through best available platform like websites, social media, etc.
- using information as driver for development and monitoring and
- mapping of information

Fig. 39 : Main sources of information for a ULB

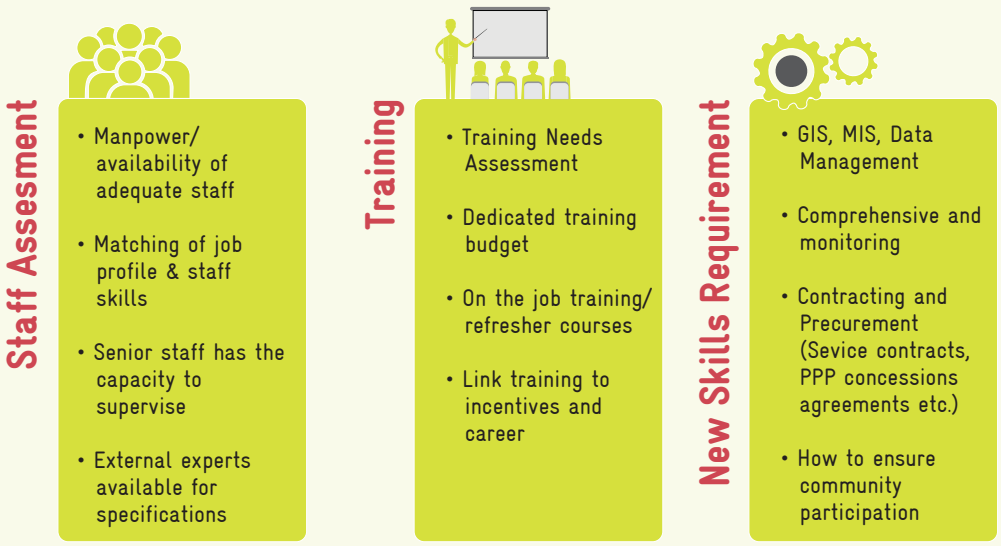
Database/ Information Hub	Census of India	Survey of India (Topo sheets, GTS Benchmarks in cities)	Satellite imagery	Revenue Department (land records, property maps)
Development Authority (Landuse maps)	TCPO (NUIS data)	ULB records	Primary survey	Sectoral information

Available data on sanitation for urban sanitation planning always needs to be combined with spatial analysis. This means to add relevant attributes (e.g. households with septic tanks, existing public toilets, etc.) to spatial maps. This generates so called thematic maps as a basis for decision making. Such maps can be developed with various layers and according to different demands.

HUMAN RESOURCE MANAGEMENT

People with the right skills at the right place can be an asset for any project. Such 'human resources', need to be managed properly to maximize their performance and ensure achievement of the strategic objectives planned for the organization or project (see Figure 40). In this process, it is important to identify and allot appropriate and well-defined tasks to the people concerned, continuously monitor and provide for capacity building / training needs, and develop new skill sets to broaden the horizons of the project / planning.

Fig. 40 : Human resource management



IMPROVED HOUSEHOLD LEVEL SEWAGE CONNECTIVITY THROUGH CAPACITY DEVELOPMENT FOR MUNICIPAL PLUMBERS

CASE EXAMPLE 8

Brief Description: The preparation of City Sanitation Plans in the cities of Raipur, Shimla, Kochi, Tirupati and Nashik supported by GIZ showed that issues relating to household level connectivity to septic tanks and to sewage systems, improper disposal of wastewater, etc. are linked to weak capacities of human resources engaged in these activities. The ground reality, therefore, calls for strengthening of the capacities of stakeholders engaged in plumbing at municipal level. For this purpose, and as part of the technical cooperation project "Support to the National Urban Sanitation Policy", GIZ prepared a Plumbers Training Module and customised it to specific contexts such as, high ground water regime and / or hilly areas. The training module was developed by GIZ along with M/s ASSIST. This module focused on specific plumbing aspects of connecting households to the septic tanks or sewerage systems.

Training programmes on this module, which can be included in existing municipal plumbing courses were conducted for municipal plumbers from 4 cities – Shimla, Raipur, Nashik and Kochi. These trainings were conducted in a partnership mode with the state government and its training institutions. Trainers from partner institution/ industrial training institutes and engineering colleges were trained for further upscaling in their states.

The training module and a manual for Training of Trainers are available online as well as handy booklets for plumbers in Hindi, Marathi, Malayalam and English for further use.

Outcome/Impact: Skilled plumbers connecting households to septic tanks and sewer lines would decrease the leakages of wastewater into groundwater and other open drains and well as decrease the risk of overflow of septic tanks.

Key message: A cadre of trained plumbers and trainers to capacitate plumbers are crucial for successful implementation of sanitation infrastructure on the ground. It is crucial that plumbers understand the concept and design of a city's water supply and sewerage system to enable them to install proper household connections thus improve and maintain overall sanitation condition of the cities.

Further Details:
www.urbansanitation.org | http://www.urbansanitation.org/e31169/e49811/ or contact dirk.walther@giz.de

CONTRACT MANAGEMENT

Contract management is crucial for appropriate implementation of any CSP. In recent years, there has been a change in approach with respect to contracts awarded by ULB's. Privatization is being encouraged and contracts are no longer limited to merely engineering, procurement and construction (EPC). Private companies are being given the opportunity to operate and manage facilities, which earlier used to be restricted to ULBs or government agencies.

This approach has brought about a healthy competition and allowed public-private partnerships to provide better facilities for the public. This coupled with different funding schemes from national as well as international donors has introduced new procurement models/mechanisms. For any contract to be managed, a strong steering including clear definition of objectives, roles and responsibilities and realistic timelines is required from the ULB or institution in charge. This necessity even increases while working with private partners.

Fig. 41 : Contract management

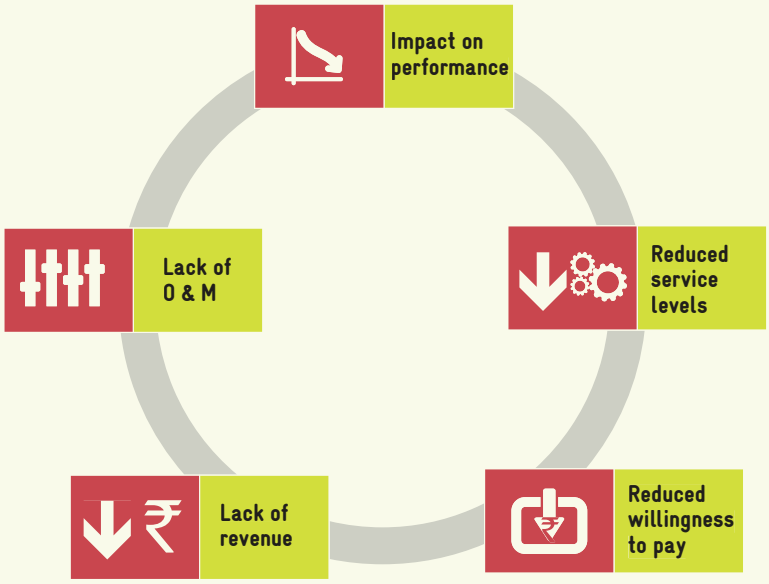
Examples of different types of contracts include:

- Engineering, Procurement and Construction (EPC)
- Public Private Partnerships (E.g. - Build-own-operate-transfer or BOOT)

INFRASTRUCTURE MANAGEMENT

As the name suggests, Infrastructure Management deals with planning, construction, operation and maintenance of various facilities provided as a part of a sanitation system. The facilities do not function properly in case of lack of maintenance and may eventually become defunct. Proper management of these is required so that the citizens can benefit from the provided services. Poor infrastructure management leads to a vicious circle which impacts performance, affects services, hampers revenue generation which eventually leads to poor O&M due to lack of funds.

Fig. 42 : Infrastructure Management



IV SUPPORTING FACTOR: FINANCING

IMPORTANCE OF FINANCIAL MANAGEMENT

- Money outflow and inflow - Financial management tools can be used to understand the cash flows of a ULB. This allows a better insight into how the operations are running, where is the money coming from and how it is being spent. This is very useful for making future decisions like budgeting, investments etc.
- Financial plan for the city - As a part of financial management, the implementing agency / institution would need to prepare a long-term financial plan for the city. This will encompass adequate and predictable resources including setting tariffs, inter-governmental fiscal transfers and subsidies to the poor households. The recovery of the costs through these resources will ensure accountability as well as financial sustainability.
- Better financial control - Financial management enables planning, evaluation, coordination and monitoring of financial activities. This can be used to for keeping a tab on costs, and also ensure returns on investment thereby enabling better financial control.
- Proper allocation of resources - The idea of the CSP is to provide sanitation facilities to all sections of the urban society. In this, special attention needs to be given to the urban poor. This also means that different levels of infrastructure and services need to be employed depending on the area, stakeholders etc. These will naturally have different capital costs, O&M expenditure etc. These considerations are included in financial management which ensure proper allocation of resources and prevent the implementers from getting trapped in high liabilities and expenditure bubble at a later point.

TYPES AND DRIVERS OF COST IN THE SANITATION SECTOR

The financial requirements of implementing and maintaining sanitation systems are categorized broadly into three categories:

– Capital Costs: These are costs which occur initially for construction of new assets or renewal of assets. e.g. asset renewal, asset expansion.

– Operating Costs: These are usually recurring costs required to operate and maintain assets and facilities. e.g. staff, electricity, chemicals, administrative costs, etc.

– Contingent Costs: These are costs which might or might not occur in the future. These are projected costs, usually not very precise and kept as a safety in case of an unforeseen event. e.g. cost of borrowing, exchange rate loss.

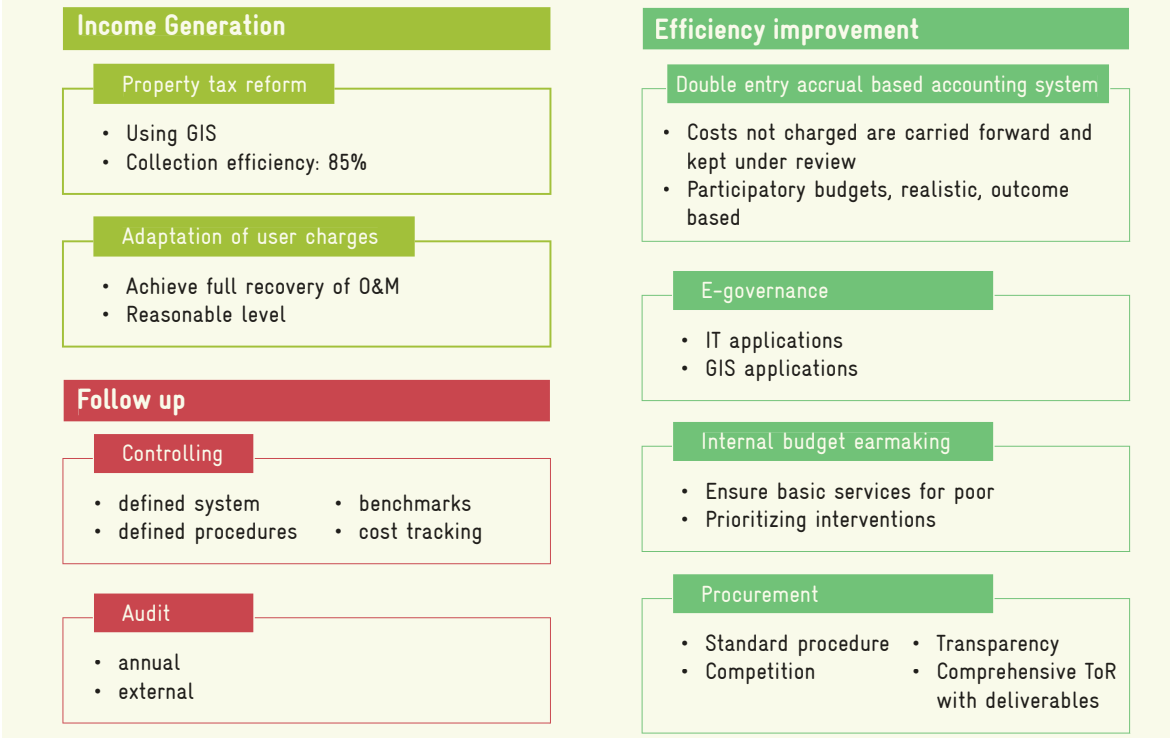
Fig. 43 : Cost Drivers

Financial requirements	Administration	Operations cost	Staff cost
Maintenance	Cost of services	New facilities	Renewal of existing facilities

FINANCIAL MANAGEMENT TOOLS

To plan, construct, operate and maintain assets under CSP, financial management is crucial. Even a very promising and well-conceived CSP may not work at all for lack of funds. Hence it is essential that certain tools and methods (see Fig. 44) are strengthened by the ULB for generating income as well as managing expenditure and income.

Fig. 44 : Tools for financial management



Income Generation

While planning the facilities, care should be taken to also plan ways of funding / income generation from the facilities which can be used for O&M.

Property Tax reform

Property tax is a good fiscal tool for ULBs but is often under-utilized as a source of income. For better evaluation and utilization of this source, methods like GIS can be employed for mapping and monitoring. By using modern tools and techniques it is possible to have collection efficiency to the tune of 85% from property tax.

Adaptation of user charges

The facilities should be able to recover their own costs wherever possible. Models like pay-per-use can be adopted where users pay for using facilities. This way O&M costs can be recovered. It should be borne in mind that the user charges should be reasonable so that most people can afford them. Additional charges could be also introduced to increase revenue, which can be used for cross-subsidizing sanitation infrastructure, e.g. environmental charges, tourist taxes, etc.

Follow up

Looking at the city level infrastructure, collection and recovery is a humongous task. This needs to be followed-up, controlled and monitored by a well defined system to make the process smooth and effective.

Controlling

A well-defined system with clear procedures needs to be put in place. These systems and procedures need to be simple but effective. For this purpose, different benchmarks can be identified e.g. an upper limit for spending per toilet seat in a community toilet is set. A record of the costs should be maintained so that any irregularities can be checked.

Audit

Audits are monitoring mechanisms which should be done annually by external agencies. This helps in keeping anomalies at bay which ensures that the monitoring process is largely unbiased.

Efficiency Improvement

There are certain methods available which can be adopted to improve efficiency in financial management. These methods can help in streamlining the expenditure thereby improving efficiency and fund utilization.

Double entry accrual based accounting system

Some ULBs have already shifted from the single entry system to double entry accrual based system in recent years. This system allows a realistic and fair view of activities of the ULB as income accrued (but not received) and expenditure incurred (but not paid for), are not reflected in the financial statements of the ULBs. Costs not charged are carried forward and are kept under review.

E – Governance

The wide-spread use of the internet has also impacted ULBs and governance in a big way. IT and GIS applications are now widely used for facilities such as bill payments, applications, approvals, tracking etc. This has made many processes hassle-free for ULBs as well as consumers, thus increasing efficiency.

Internal budget and earmarking

This system allows ULBs to have their budgeting for equitable distribution of funds to ensure the inclusion of urban poor in the plans. This allows transparency in financial management and also holistic development of the urban area. Priority based utilization of funds allows cost efficiency.

Procurement

Procurement is an important financial management tool which can greatly affect the utilization of funds as well as the quality of services provided. It is imperative that a transparent standard procedure be employed for procurement. The procurement should be at competitive rates without compromising on quality. It is also necessary to decide the terms of reference with the vendors while finalizing procurement orders. This helps in maintaining the desired quality of deliverables.

KEY MESSAGES FROM MODULE 5

1) A successful CSP implementation needs more than technical solutions. It requires functional institutions, updated legislation, an efficient management system and tools for financial management.

2) Recommendations in the CSP need to showcase how to overcome existing gaps in these four supporting pillars.

MODULE 06

HOW TO MAKE CSP A LIVING DOCUMENT?

LEARNING OBJECTIVE

To get a detailed understanding on the importance of making CSP a living document and which processes are relevant for updating the document

Rapid urbanization, development of technologies for sanitation, impacts of population growth, industrial development and climate change continuously influence the framework conditions for a CSP. Thus, a CSP has to respond to all these changes through revision at regular intervals for being a relevant and a 'living' document.

I. INTRODUCTION

A City Sanitation Plan is a document envisaged for 30 years with projections developed at a particular point in time. This makes revision of the plan a necessity and the following issues need to be factored in:

- Rapid urbanization in India and growth of economic activities in cities
- Further development of technologies and materials used for urban infrastructures
- Development in other sectors such as population growth, establishment of industries, consumption patterns, housing projects, etc.
- Changes of availability of finances, internal structures, roles and responsibilities within the ULB and state departments

II. PROCESSES RELEVANT FOR CONSTANT UPDATING OF CSP

The CSP lays the sanitation vision for the city with interventions of varying time spans, including long term interventions up to 30 years. During this period, the city may change in unprecedented fashion with respect to parameters within / outside human control. For example unplanned population growth (e.g. through incorporation of suburban areas) and intensified industrialization would lead to increased water demand affecting the projects and long term infrastructure provisions planned for in the CSP. Policies of the governing institutions which play a major role in the sanitation sector and the regulatory frameworks within which they operate could also change. Factors beyond the city's direct control like Climate Change can also have drastic impacts. Therefore it is necessary that the CSP is constantly updated at regular intervals, preferably not less than every five years to account for these changing processes as described in Fig. 45 below:

Fig. 45 : Relevance of processes to updation of CSP sections

	Urban Growth	New industries	Climate change	Regulatory framework
Water supply	✓	✓	✓	✓
Waste water management	✓	✓		✓
Access to toilets	✓			✓
Storm water management	✓		✓	✓
Solid water management	✓	✓		✓

III. CSP – A LIVING & DYNAMIC DOCUMENT

The design of a CSP action plan with short, medium and long term actions already indicates a time schedule for revision (5 years, 15 years, and 30 years). The document is dynamic since not all actions will be implemented exactly in the predicted order and the ULB needs to have enough flexibility to respond to external windows of opportunities. The Action Plan is a guiding framework for decision making on specific projects and shows which short term actions provide the basis for mid and long term changes.[30]

Examples for possible actions under the three sections are:

SHORT TERM ACTIONS WITH A COMMON DURATION OF LESS THAN FIVE YEARS

- Septage management
- Toilet construction
- Hygiene education
- Improving practical efficiency of existing infrastructure
- Setting up a monitoring system

MEDIUM TERM ACTIONS WITH A COMMON DURATION BETWEEN THREE AND FIFTEEN YEARS

- Implementing projects like storm water drains, sewage systems, treatment facilities etc.
- Assessing their impacts and outcomes

LONG TERM ACTIONS WITH A COMMON DURATION OF MORE THAN THIRTY YEARS

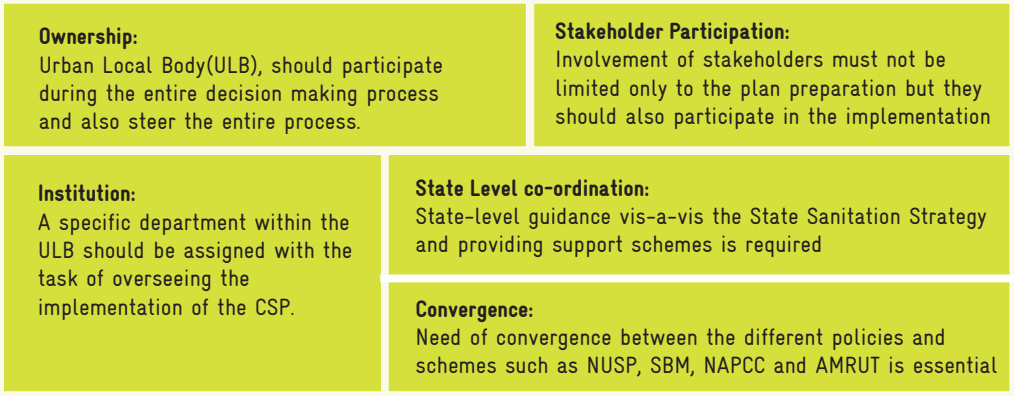
- Meeting demand for facility expansion
- Sustainability of the facilities and services
- Monitoring socio-economic, health and environmental benefits

The CSP has to be understood as a key instrument for step-wise creation of a city-wide sanitation system including services, infrastructure and performance improvement. The CSP helps today's and tomorrow's ULB officials to make informed decisions. As the time frame of the CSP reaches 30 years, the regular revision of a CSP serves not only to take changes in the conditions into account, but also to monitor and evaluate the implementation process in the city. The revision opens the chance to assess, which measures have been implemented, which measures are delayed or not planned yet and why. This can lead to a reconsideration of priorities.

In order to ensure such continuation, revision and follow up of the CSP, a few key aspects have been identified described in Fig. 46 below:

30 Manual on Sewerage and Sewage Treatment Systems, MoUD, November 2013 http://moud.gov.in/sites/upload_files/moud/files/Chapter%2010.pdf

Fig. 46 : Key aspects of making CSP a living document



MONITORING AND UPDATION OF CSP

The implementation and updation of the CSP requires a monitoring system to be put in place. The first and most important step for the set-up of such system is the continuation of the City Sanitation Task Force even after the completion of the CSP. While approving the CSP the City Sanitation Task Force should already prepare a formal plan for monitoring various actions from the action plan and design a format for progress reporting. A nodal officer should be designated for each action to be implemented. The formal plan for monitoring consisting of

- Nodal officer for each actions from action plan
- Roles and responsibilities for CSTF during implementation and monitoring
- Time schedule and format for progress monitoring (e.g. every 6 months in written and in meetings of CSTF)

should then be approved by the Municipal Council together with the CSP. New members could be added to the CSTF during implementation and monitoring as well as smaller working groups within the CSTF can be formed for separate lines of actions.

RELEVANCE OF CSP FOR THE ON-GOING NATIONAL URBAN MISSIONS

The City Sanitation Plan is to be used as a comprehensive base document for the on-going urban missions of Government of India. For the implementation of Swachh Bharat Mission and AMRUT at city -level the CSP can provide baseline data as well as potential projects identified based on actual evidence from the ground and with the endorsement of the Municipal Council and the CSTF. For SBM the relevant data on individual household toilets, public and community toilets as well as on Municipal Solid Waste can be extracted from CSP and integrated in the Swachh City Plan.

The Swachh City Plan furthermore requires Action Plans and cost estimates for the following goals:

- 100% elimination of open defecation
- Action Plan for achieving 100% door to door collection
- Action Plan for 100% transportation of waste
- Action Plan for 100% processing and safe disposal

These strategies can be in line with the CSP strategies and action plan. AMRUT on the other hand covers the sectors of Water Supply, Wastewater Management and Storm Water Management. The baseline data from the CSP can be taken to complete the Service Level Improvement Plans (SLIP) under AMRUT. Furthermore priority areas of action identified under the CSP can then be developed into DPRs to be submitted under AMRUT, where 100% water supply and wastewater management is the utmost priority.

KEY MESSAGES FROM MODULE 6

A regular updation of CSP is required for the document to remain relevant for city planning. The average shelf life of such a planning document is 5 years.

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