



# CITY SANITATION PLAN FOR **KOCHI**





## FOREWORD

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I was honoured and delighted to be asked to contribute the Foreword to this brochure on City Sanitation Plan of Kochi. We are pleased to provide some introductory thoughts to this document and like to express our deep appreciation for the initiative and support given by GIZ in the preparation of the City Sanitation Plan. This document is a succinct overview of the City Sanitation Plan for City of Kochi in order to recognize the stress areas in the sanitation sector and establish priorities in the intervention areas along the defined strategic guidelines.

City Sanitation Plan is a 30 -year strategic framework to deliver on the long-term vision we have set for the sanitation sector of Kochi city. This framework forms the basis on which the City Administration will work with stakeholders -including other spheres of government, service providers and beneficiaries - in our common mission to overcome the vast gaps in sanitation services.

The process culminating in this framework included in-depth research and wide-ranging consultation with city stakeholders. Building on the objectives set out in the National Urban Sanitation Policy of 2008, the technical, team under GIZ conducted 6 months of data-driven research which resulted in the release of the preliminary draft 'Kochi Status Report' document for stakeholders' comment in August 2010. A two-month period allowing for stakeholder's comment and consultation followed. Post validation of the data presented in the preliminary draft, the draft 'City Sanitation Plan' was released in September 2011 followed by stakeholder consultations and subsequent finalization of the strategic framework. Today, we can confidently say that all interested parties had a meaningful opportunity to contribute to the adopted framework.

The strategic plan reflects the thoughts, feelings, ideas, and wants of the stakeholders of the city and moulds them along with the city's purpose, mission, and regulations into an integrated document. We consider the evolving agenda based on the document to be ambitious, but achievable. This strategic framework represents the first foundation of a new collective process which will breathe life into our long-term vision and strategy and will guide our collective actions as we strive to meet the needs of the city and our community. Wide ownership of the process will ensure that the strategy remains dynamic and adoptable as it is continually enriched and enhanced by the experience of implementation. This document is not a static document as this can be quickly adjusted with additional scenarios that may occur.

The format implementation of this agenda starts in earnest today with the release of this strategy document and continues for the next 30 years. Along the way we intend to address the national goals to which government is committed and meet the needs of the community we have chosen to prioritise. It is my hope that this approach will bear productive results for the benefit of the city in future and i look forward to the active interest and continued support of all stakeholders.

Thank you very much.

A handwritten signature in black ink, appearing to read 'Tunny'.

**TONNY CHAMMANY**  
Mayor  
Corporation of Cochin

## KOCHI

Cochin also known as Kochi is situated in the Ernakulam district of Kerala State, lies along the Malabar Coast of India. The area under Greater Cochin Development Authority (GCDA) encompasses Kochi, six municipalities and 25 panchayats covering an area of 632 sq. Km and forms the largest urban agglomeration in Kerala. The city is administrated by the Corporation of Cochin (CoC). Kochi has 74 wards within 7 administrative zones.

Kochi is well connected by road, rail, water and air to the rest of the country. The Cochin port is one of the major ports in the country. Kochi being a harbour city and a major transport hub linking all the tourist destinations in Kerala is popularly known as " Gateway of Kerala". These economic and tourist activities adds altogether a different dimension to the sanitation issues of Kochi.

Kochi secured a over all sanitation score of 41.07/100 and has been ranked on 81st position in the sanitation ranking exercise carried out for 423 cities under the mandate of National Urban Sanitation Policy (NUSP) through the Ministry of Urban Development (Figure 1). The overall sanitation score indicates the need for considerable improvements in sanitary conditions of Kochi.

In line with the NUSP directives, CoC has done a detailed assessment of sanitary conditions in Kochi. Some of the pressing sanitary issues have been presented in fig 3. This assessment has been done in order to come up with a City Sanitation Plan for addressing the current issues and future sanitary requirements of Kochi thorough a participatory approach. CSP takes into account factors such as cross cutting issues, inclusivity of urban poor, prioritisation of issues & solutions at ward level granularity, prioritisation of issues and to come up definite timeline for implementation of solutions.

The GoI had initiated a city sanitation rating exercise based on urban sanitation indicators. The aim of this exercise is to help cities prioritise areas of improvement vis-à-vis development and implement holistic CSP.

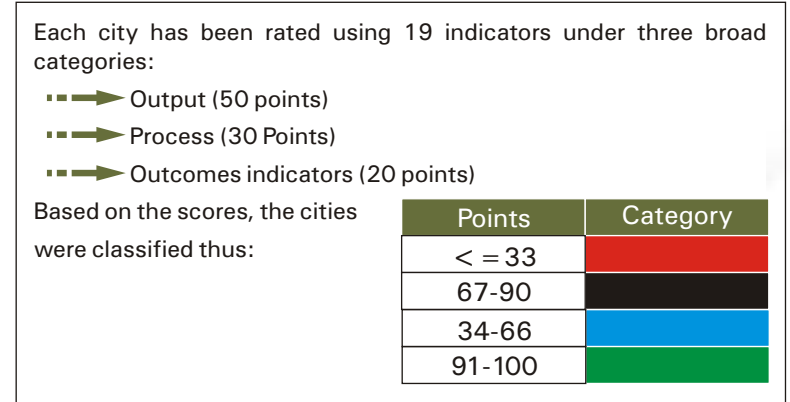


Figure 1: National Urban Sanitation Policy Sanitation Rating



Figure 2: NUSP Sanitation Ranking for Kochi



Figure 3: Sanitation issues in Kochi City

## 1.2 : NATIONAL URBAN SANITATION POLICY

The Ministry of Urban Development, Government of India, issued a National Urban Sanitation Policy in 2008 with a vision to make all Indian cities and towns completely "sanitised, healthy and liveable".

The NUSP guides states to come up with their own detailed state-level urban sanitation strategies and City Sanitation Plans (CSP). It moots the idea of completely sanitised and open-defecation-free cities as its target, and the setting up of a multi-stakeholder City Sanitation Task Force to achieve this. The Policy gives significant emphasis on environmental considerations, public health implications, and reaching the underserved and urban poor. The policy suggests four funding options: funds directly from central and state governments; funds through existing funding schemes; funds via public-private partnerships; and funds from external funding agencies. The Policy directs that at least 20% of the funds should be earmarked towards servicing the urban poor. The GoI also plans to confer awards to the best performing cities, which is reminiscent of the Nirmal Gram Puraskar awards for villages for the same cause.

### SANITATION STATISTICS OF URBAN INDIA

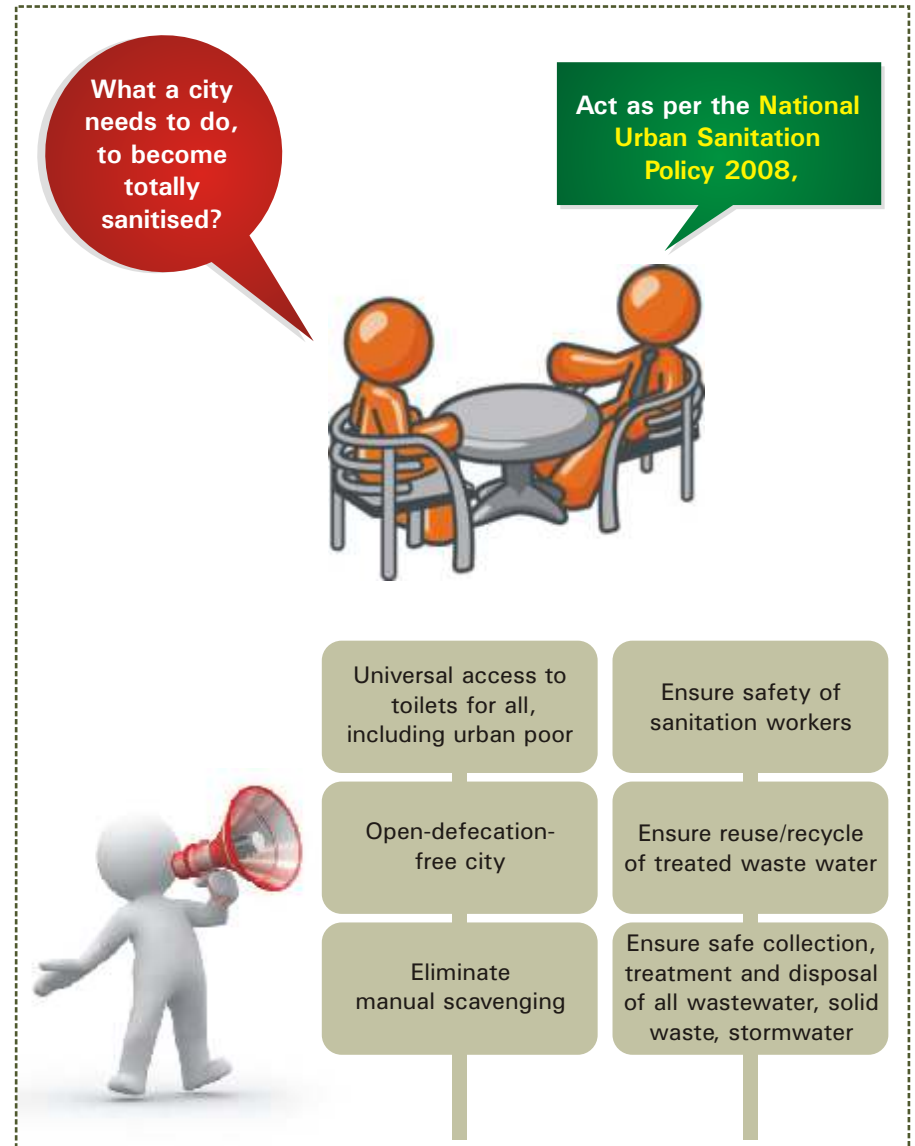
7.87% urban households do not have access to toilets and defecate in the open

More than 60% of the country's GDP is being lost due to public health and environmental costs due to unsafe sanitation

More than 37 % of the total human excreta generated is unsafely disposed



75% of all surface water across India is being contaminated due to the discharge of untreated municipal wastewater



### 1.3 : APPROACH AND METHODOLOGY

The approach and methodology adopted for the development of CSP is depicted in Figure 4.

#### CSP FOCAL POINTS:

##### PLAN COMPONENTS

- Access to Toilets
- Waste water Management
- River Pollution and Storm Water Management
- Water Supply
- Solid Waste Management



##### STRATEGIC SUPPORT PILLARS

- Governance and Institutional Framework
- Capacity Building
- Awareness Generation
- Financial Sustainability

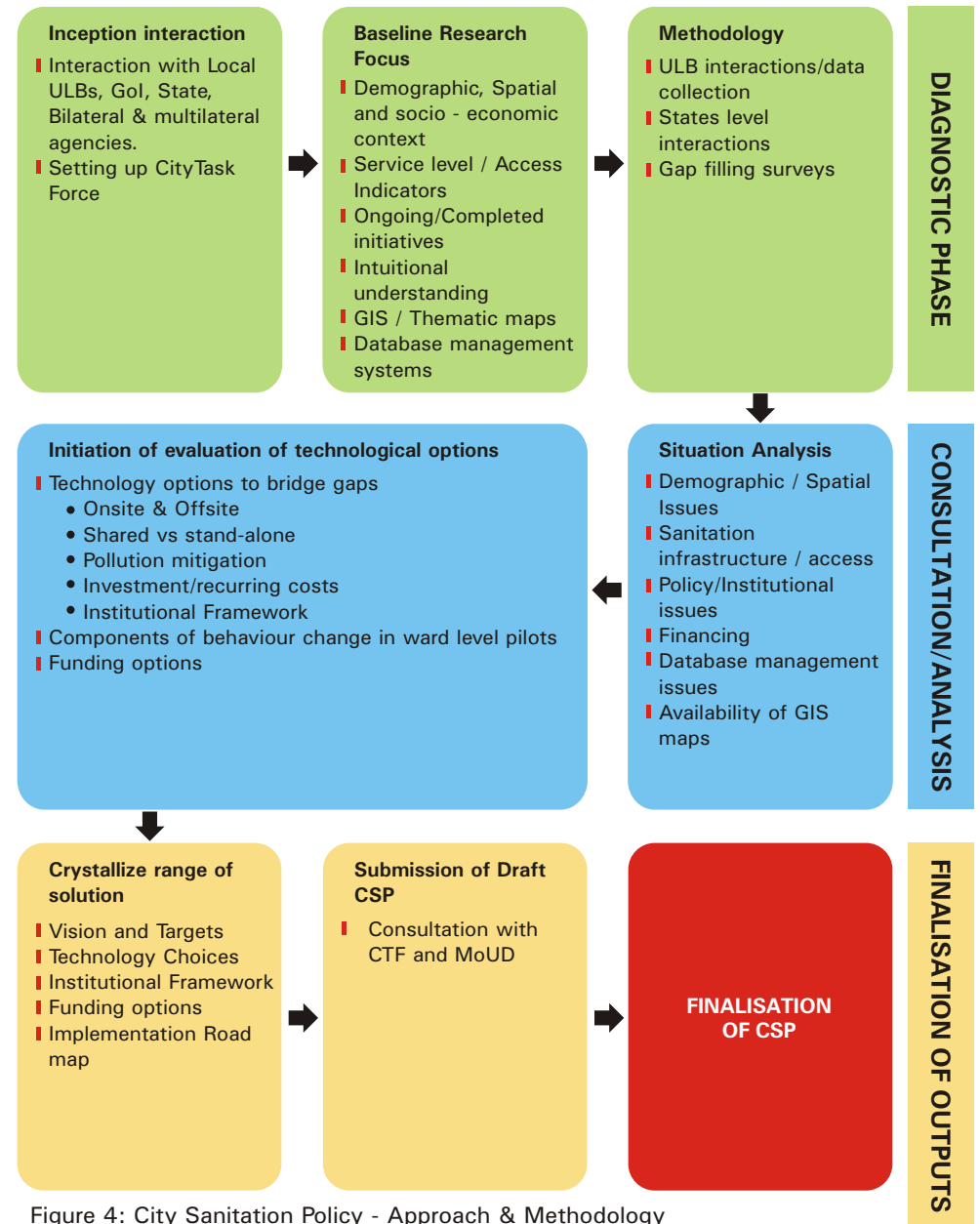


Figure 4: City Sanitation Policy - Approach & Methodology

Urban areas by nature are in continuous evolution, and undergo cyclical periods of natural growth, decline and revitalization over the long-term. Recognizing trends is a key element in ensuring the efficient long-term allocation of resources, and a sound principle of land use planning.

Population projections help in long-range planning and infrastructure investment by indicating the scope and scale of population change.

### 1. GROWTH & PRESENT POPULATION

Kochi is a part of an extended metropolitan region which is the largest urban agglomeration in Kerala. As per the 2011 census, the population of Kochi is 6,01,574 (Males: 2,96,668, Females: 3,04,906). The figure 5 indicates decreasing population growth trend in the Cochin corporation area. Despite the decreasing population growth in the cochin Corporation area, migration into the city is expected to result in the augmentation of urban agglomeration.

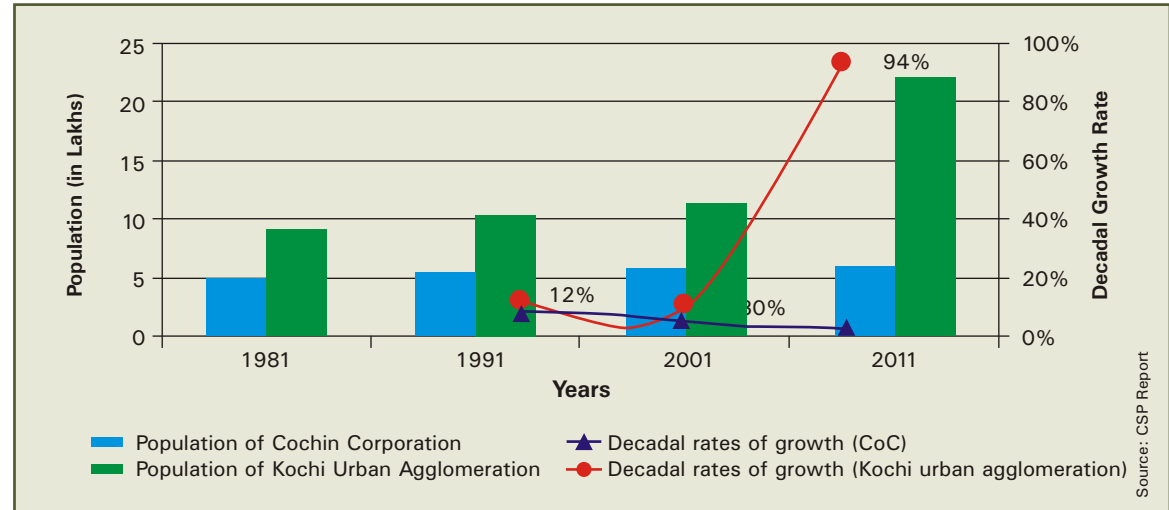


Figure 5: Kochi's Population and Decadal Growth Rate

- Notably large urban agglomeration would need serious consideration in the city development pronouncement.
- Attracts approximately 2.5 Lakhs people daily as floating population.

### 2. POPULATION PROJECTIONS

The Cochin corporation population is expected to grow from 6.0 Lakh to 6.6, 7.1, 7.58 Lakhs by 2021, 2031 & 2041 respectively. The figure 6 shows city's population projections in various studies and reports.

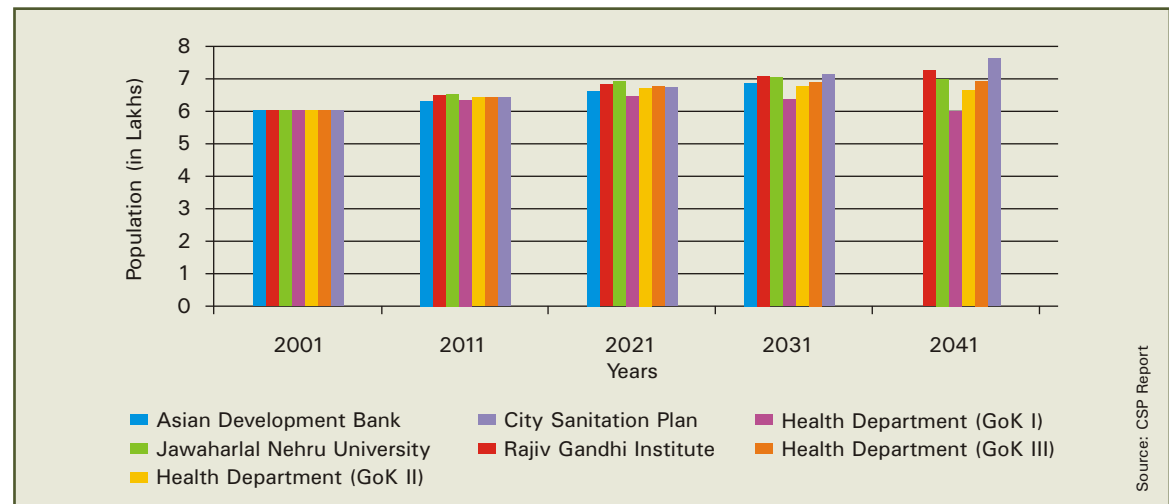


Figure 6: Kochi's Population Projection

- Kochi urban population is approximately 33-35% of its total population.
- There are 283 slums within CoC area.

## SANITATION COMPONENTS

### How is the city's waste water management?



#### a) Inadequate Septage Management

There are two waste water management systems in Kochi city- Off-site sanitation (through sewerage system) and On-site sanitation (through septic tanks & soak pits). The schematic representation of city's waste water management is presented in figure 7.

Kochi's existing sewerage system covers only 5% of the CoC area. The Kerala Water Authority's (KWA) sewerage networks runs through approximately 4 sq km area. The records indicate that Kochi has 1052 sewerage connections since 1998-99. Additionally the GCDA maintains a small network in the Marine drive area and covers .01 square kilometres.

The Kochi has two sewage treatment facilities situated at Elankulam and Marine drive. The KWA maintains Elankulam STP which has the capacity of only 4.5 MLD. This STP is equipped with

activated sludge treatment system. The treated effluent is discharged into Elankulam Thodu. The marine drive STP has the capacity of 900 m<sup>3</sup> and is being maintained by GCDA. This STP has a collector tank, aeration chamber, clarifloculator and a filter bed. The treated effluent from this plant is discharged into the nearby sea.

About 95% of Kochi's sewage is managed through some form of on-site sanitation facility. Typically, wastewater from households is routed to septic tanks, but in recent years, a combination of growth of high-rise buildings and KSPCB regulations for onsite treatment systems for high-rise and commercial establishments has increased the penetration of onsite treatment. The survey revealed that the 45 % of the respondents had not cleaned their septic tanks at all which indicates possibility of percolation or leakage into storm drains, rest signify clearance frequency of once in 2-3 years by private service providers.

**URBAN POOR:** In urban poor areas, toilets are usually outside the living premises. Sharing of toilet by a group of households is also common in these areas. Houses in better conditions have integrated toilet rooms. Effluents of septic tanks as well as grey water outlets typically discharge into storm water drains. Occasionally toilets even discharge into the receiving waters without any pre-treatment.

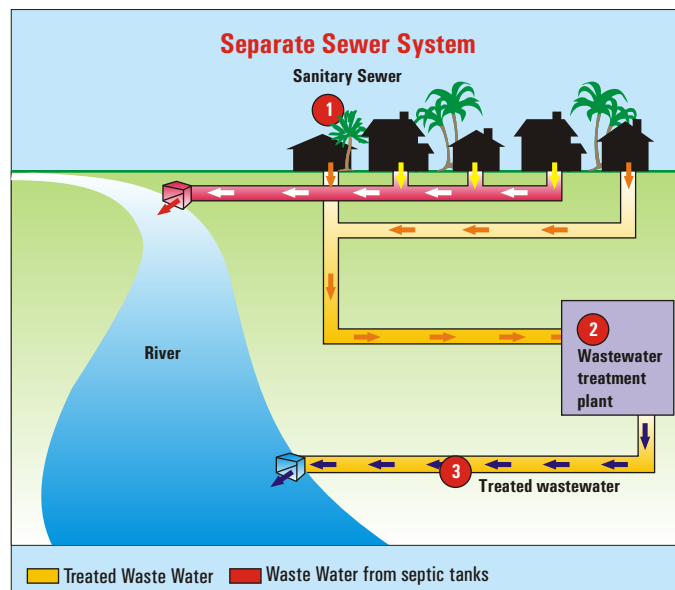


Figure 7: Schematic Diagram of Kochi's Sewerage system.



Figure 8: GCDA's sewage treatment plant at Marine Drive



Figure 9: Inadequate septage management



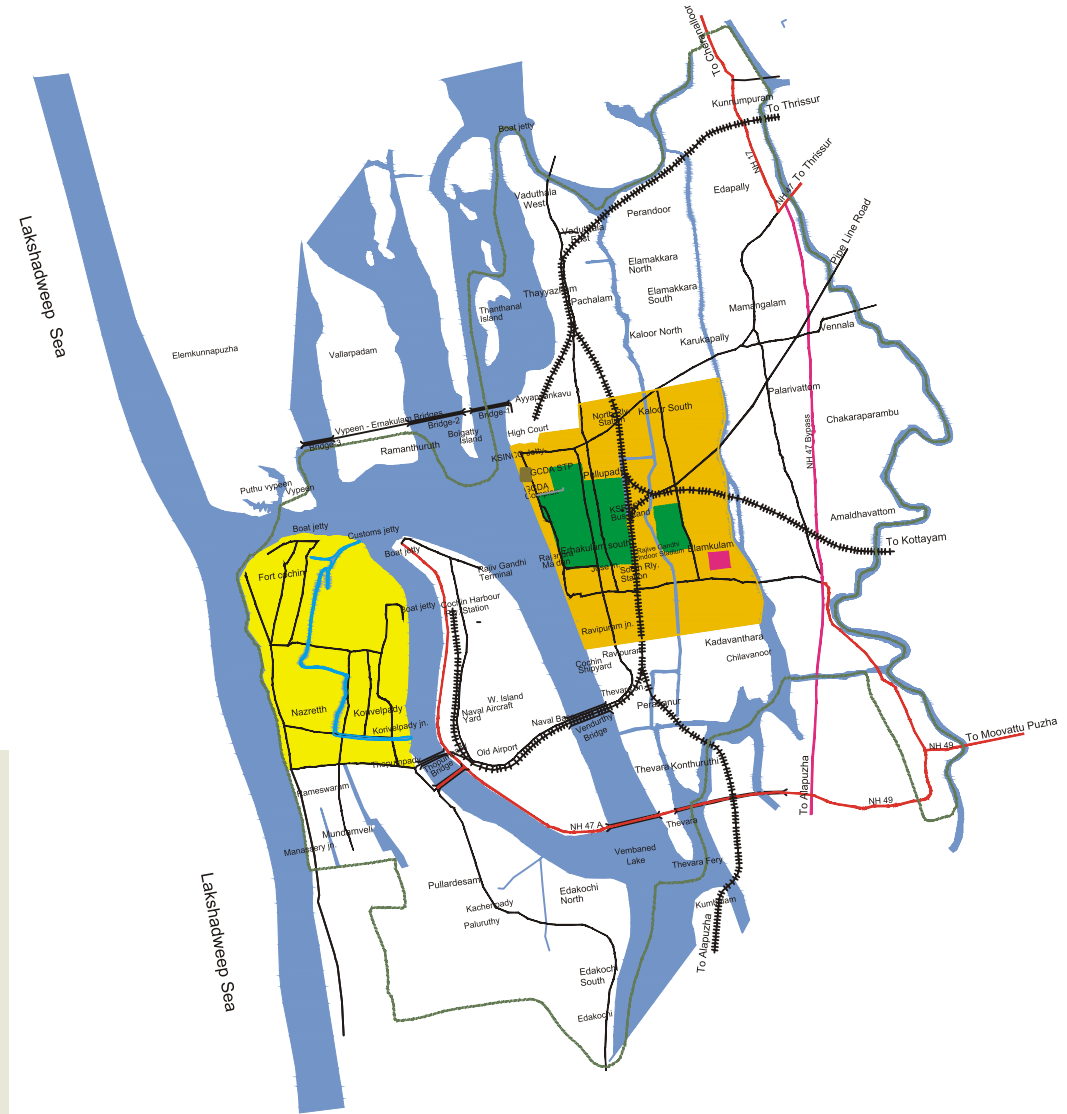
**What are the main issues that need to be addressed?**

1. Since Sewerage coverage is limited, waste water management is predominantly through septic tanks and other localised means. Kochi has negligible sewerage coverage, initiatives to expand sewerage network face a number of challenges including narrow street width and a high water table.

Sewerage coverage is limited to parts of central business district of Kochi and along the marine drive. Overall, less than 5% of the city is sewered. Reported data on incoming waste water quality data at STP indicate abnormally low BOD levels, possibly due to seepage/dilution with ground water.

2. Oversight of onsite sanitation and septage management coupled with inadequate regulation is a serious concern on grounds of public health in the entire urban agglomerate.

Private agencies provide septage clearance service and the sector is completely unregulated. Septage is routinely dumped illegally in either water bodies or vacant plots of land, with negative environmental consequences with respect to groundwater contamination and pollution in water bodies and canals.



<span style="color: green;">■</span> Area Covered by existing sewerage system	<span style="color: magenta;">■</span> 1. Additional 10 MLD STP (South Ernakulam)
<span style="color: orange;">■</span> Proposed Sewerage System - South Ernakulam Population - 60,000	2. 23 MLD STP of North Kochi at Mundamvelli
<span style="color: yellow;">■</span> Proposed Sewerage System - North Kochi Population - 180,000	<span style="color: brown;">■</span> GCDA STP

Figure 10: Existing and upcoming sewerage system in Kochi

**Weaknesses**



- 1.Flat terrain and high ground water table conditions are not favourable for a conventional under ground drainage system.
- 2.Due to high water table septic tanks, two pit latrines etc., do not function properly resulting in pollution of water and subsoil.

**Threats**



High pollution loads due to crude on-site systems to waterways and canal continue to be a risk.



## SANITATION COMPONENTS

### Does the city have access to toilets?



#### b) Access To Toilets

##### What if I stay in an urban area?

The survey revealed 95.5% of the respondents had in-house toilet facilities. Significant portion of households in Kochi has access to individual toilet facilities. While 4.1% of the respondents use shared toilets, whereas 0.4% resorted to open defecation. The prevalence of open defecation is rare but matter of concern. It is prevalent in Vathuruthy (along railway track), Ayyappankavu, parts of Gandhinagar and Mattencherry (along the canals).

In terms of toilet maintenance, 82% respondents had problems with maintenance.

##### What if I stay in an urban poor area?

The slum mapping exercise revealed 72% of the poor households had in-house toilet facilities, 25% depends on public toilets whereas 3% resort to open defecation (indicated in Figure 13). The exercise also revealed that the sanitation facilities are either poor or non-existent in the below-poverty line (BPL) and slum areas (i.e. inadequate toilet infrastructure at Mundamveli). Some slum areas have community toilets, each being shared by roughly ten households. These community toilets are equipped with pit laterines and lack cleanliness due to inadequate supply of water. The outlets of toilets have been directly connected to a waterway or canal in several cases.

The exercise revealed that the 80% of the respondents were willing to pay for public toilets. Out of these 47% were prepared to pay Re 1 and 49% were willing to pay between Rs 1-3 per use, 3% were willing to pay more than Rs 3 per use. This indicates the need for shared facilities in areas where access is constrained.



Figure 11(a): Poor condition of CTC



Figure 11(b): Poor condition of CTC

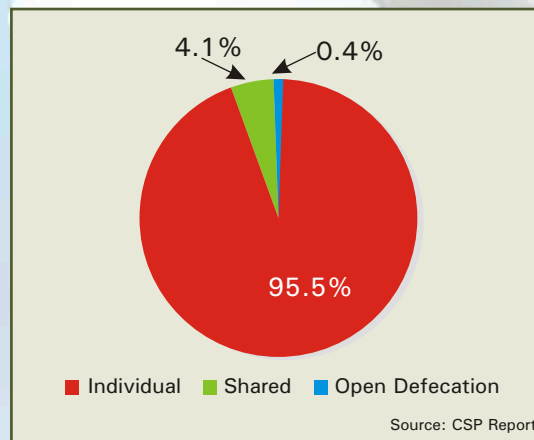


Figure 12: Distribution of Toilet Facility

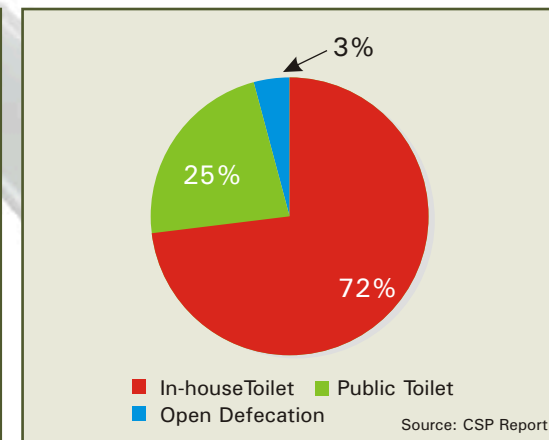


Figure 13: Access To Toilets - Urban Poor



**What are the main issues that need to be addressed?**

Despite a reasonably good coverage and access to individual toilets, there is prevalence of open defecation in a number of low-income pockets. Open defecation accentuated by influx of migrant labour population has to be looked into.



**Strengths**

Good coverage of individual toilets (95%)



**Weaknesses**

Limited availability of community toilets in slum pockets and public toilet facilities in commercial areas.



Figure 14: Toilet at Slums

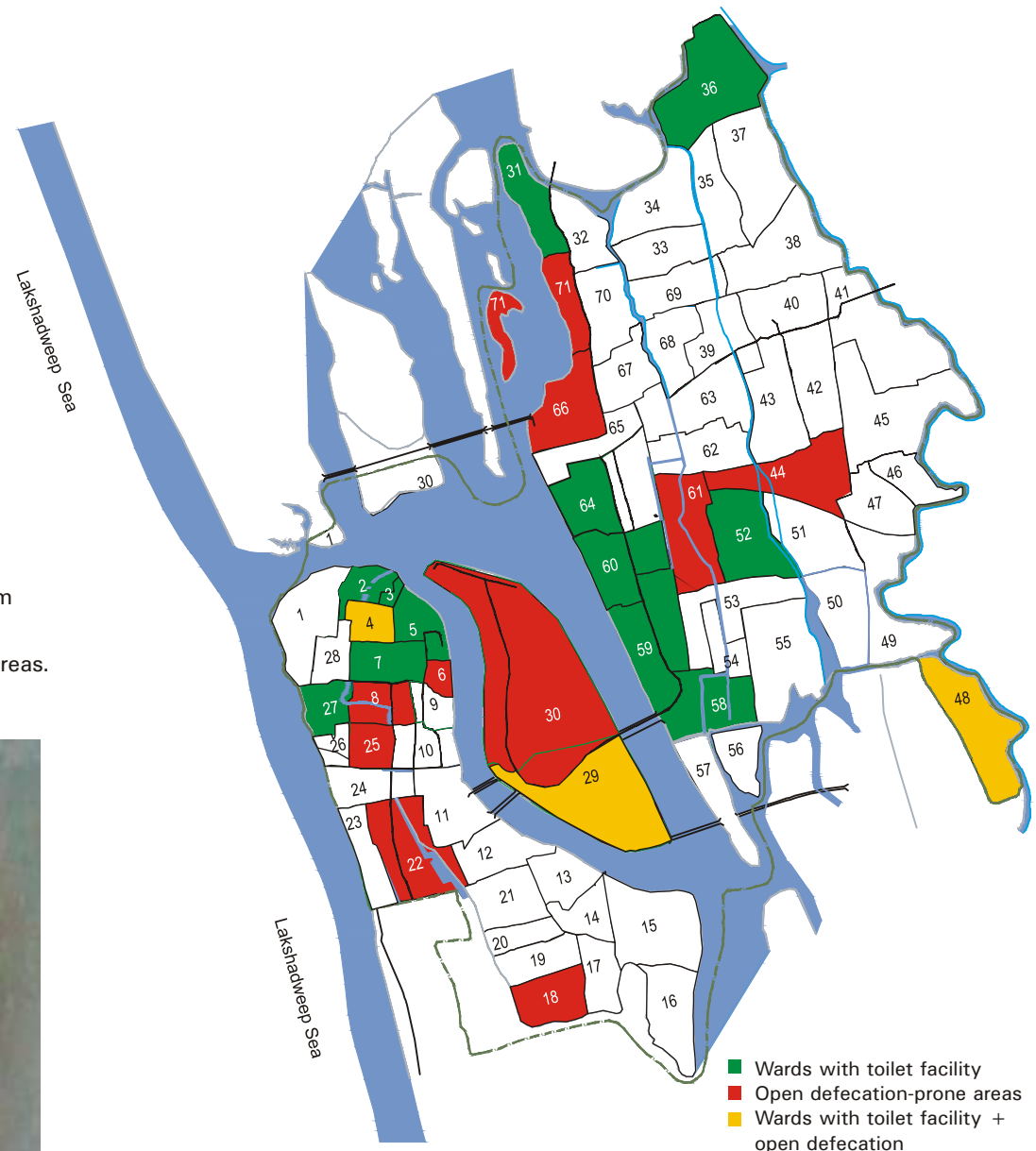


Figure 15: Availability of Public Toilets and Open-defecation-prone areas in the city.

**SANITATION COMPONENTS**



**c) Water Supply**

Kochi’s primary source of drinking water is the Periyar River which is located 20 km northeast of CoC. The water treatment plant called the Aluva Head works (installed capacity of 225 MLD) services CoC, four adjoining municipalities and 27 Panchayats. As indicated by KWA, CoC currently receives approximately 170 MLD of water from Aluva plant.

The present storage and distribution system has three ground-level storage reservoirs and seven elevated overhead tanks, which have a combined storage capacity of 10 million litres. Only one overhead tank at Thoppumpady is under operation. The rest are not functional due to inadequate pressure of water. Presently, there are three distribution mains from the Aluva Water Treatment Plant and a total water supply distribution network of approximately 1,500 km.

The city has more than 109,500 reported water connections, which translate to more than 83% coverage in terms of water supply .Although the entire CoC area is said to be covered

with piped water supply network, households seem to have supplementary sources of water supply. As per the primary survey findings while more than 80% of households rely on municipal water supply, about 35% of respondents supplemented this with other sources including bore-wells and private sources. Similarly, the survey of commercial and industrial establishments, schools and hospitals found that 67% of the establishments relied exclusively on KWA water supply and 16% also had their own bore-wells for water supply.

The present per capita water availability to the Ernakulam region is estimated to be approximately 90 LPCD. Parts of West Kochi, such as the Mattancherry area suffers from low water supply, estimated to be approximately 25-30 LPCD. As a result, many households in the West Kochi area rely on private tankers for additional supply of water. The sources for these tankers are from the Periyar River at Aluva area. The CoC normally makes 1200 trips/month with each tanker making 3-4 trips/day which depends upon the service area. The primary survey revealed, majority (49%) of respondents reported 2-4 hours per day, 34% had reported more than 8 hours per day, 12% reported 4-8 hours per day and 5%, less than 2 hours per day. More than a third of the respondents indicated that the water supply quantity is insufficient. In terms of perception of water quality, a majority 64% of the respondents consider water quality as average or poor. Kochi’s 60% water is accounted as Non-revenue water.

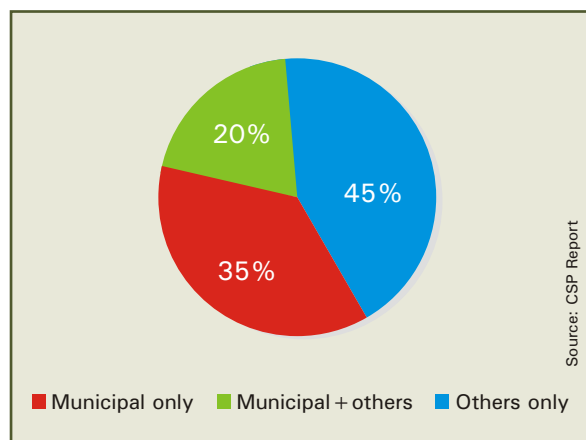


Figure 16: Sources of household water supply

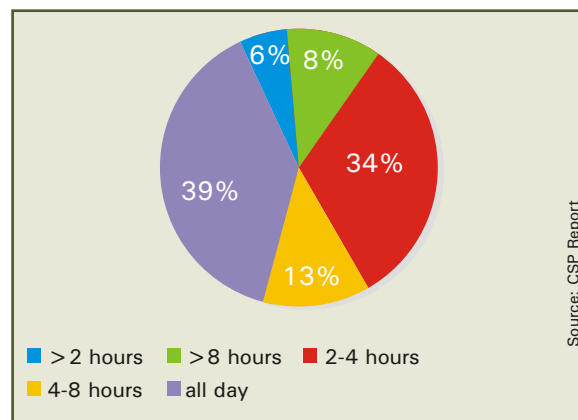


Figure 17: Duration of water supply

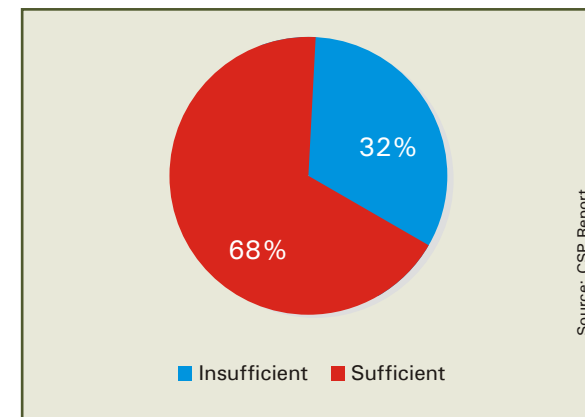


Figure 18: Satisfactory levels with respect to water supply

## SANITATION COMPONENTS



### What is the status of water supply in slums?

#### Urban Poor:

The primary survey revealed that all the slums in CoC are equipped with a water supply network and thus seem to have a reasonable good access to water supply relative to the rest of the city. However, while many of the slum dwellings are pucca structures, most residents often do not have direct access to drinking water supply at the household level. Often, several households, usually ten or more, share one water pipe and a community toilet. In areas like



#### Weakness

Existing treatment and transmission capacities are inadequate to meet the future demands.



#### Threats

Absence of comprehensive water management system threatens the sustainability of the system in the long run.

#### Issues

Water supply is beset by information inadequacies, poor service delivery and poor cost recovery.

Kochi's water supply coverage is about 83%, still parts of West Kochi (such as the Mattancherry area) suffers from very low and unreliable supply in some cases as low as 25-30 lpcd as against the norm of 135 lpcd. Households there therefore resort to expensive private tankers. Water supply is intermittent and ranges from half an hour to eight hours per day. Even though KWA has adopted 100% metering of house connections, various assessments revealed that nearly 40% of water meters are faulty. As a result of inadequate processes for meter reading and maintenance, volumetric tariffs are not rigorously implemented. While reported collection efficiency is poor at 22%, O&M costs are not reported at CoC level therefore constraining analysis of cost recovery of water supply services within CoC.

West Kochi, where the average water supply per capita per day is as low as 25 lpcd, piped water is only available twice a day, for an hour each. The water pressure is often very low, and access requires the use of a hand pump. Moreover, the water quality is poor. Primary field surveys revealed that in areas such as Mattancherry, residents of the slums reported the presence of worms and maggots in the water, rendering it unsafe to drink without boiling.

The slum survey carried out by Kerala State Urban Development Project (KSUDP) for 70 select slums indicates the availability of public water taps in 93 % of the slum settlements, and that five out of the 70 slums do not have any public water taps at all. KSUDP's findings also suggest that in only 89% of settlements is supplied from municipal water system. The survey also reveals a huge disparity in terms of quantity and the duration of water supplied.



Figure 19: Standpost in the slum of Kochi

**SANITATION COMPONENTS**



**d) Drainage network and natural drainage**

Kochi is characterized by flat topography and high water table. The city has sand bars running from the north to the south, with several tidal canals in between. The climate in Kochi is tropical and the city enjoys monsoons twice a year, translating to annual rainfall of approximately 3,099 mm. These natural factors in addition to narrow roads and drains make drainage management a challenge for the city. The city has three levels of drainage systems- primary canals (major natural canals), natural and man-made secondary drains, area drains.

The city is undergoing massive reclamation for development and creation of hydraulic barrier bunds which impact natural flushing in the canal system. In addition to this siltation, sewage dumping & disposal, pollution due to coconut husk retting, industrial pollution from the Eloor Kalamassery belt and over-exploitation of fish & other resources poses major threat to Kochi's Backwaters. There are no large industrial units within CoC. However, there is concern of industrial pollution from Eloor-Kalamassery industrial belt from where about 260 MLD effluents are discharged into the backwaters. The industrial complexes depend on the river for intake of process water and disposal of effluents. The Greater Kochi area ranked 24th (with CEPI score of 75.08) amongst the critically polluted areas in the country.

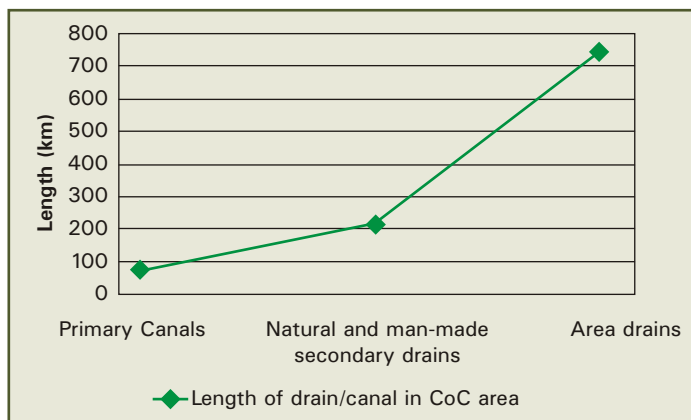


Figure 20: Kochi's 3 level Drainage System

The river quality data of Periyar and Chitrapuzha rivers revealed high coliform count at Kalady and low dissolved oxygen (DO) level at Brahmpuram, Manachahadavu and Irumpanam which is estimated to be influenced by non-industrial sources. The reason for non-industrial pollution is negligible sewerage coverage and high dependence on on-site sanitation.



Figure 21: Garbage in open Drain

**SANITATION COMPONENTS**



**Weaknesses**

Area drains cover only 41% of the total area. Flooding is a result of decreased carrying capacity of canal system due to encroachment, conversion of canals to roads, waste dumping and obstruction caused by utility lines and silting.



**Opportunities**

Greater focus on Inland water transport would help conserve primary canals.



**Issues**

The dumping of solid waste and waste water flows render storm drains ineffective and are making them vulnerable pollution hotspots.

Almost all tidal canals are in poor condition due to dumping of wastes, lack of facilities for cleaning, inaccessibility of cleaning equipment. There is a lack of city wide drainage & canal master plan, lack of integration and inadequate focus on design requirements which limits the functioning of the city's drain network.

Figure 22: Blocked drain

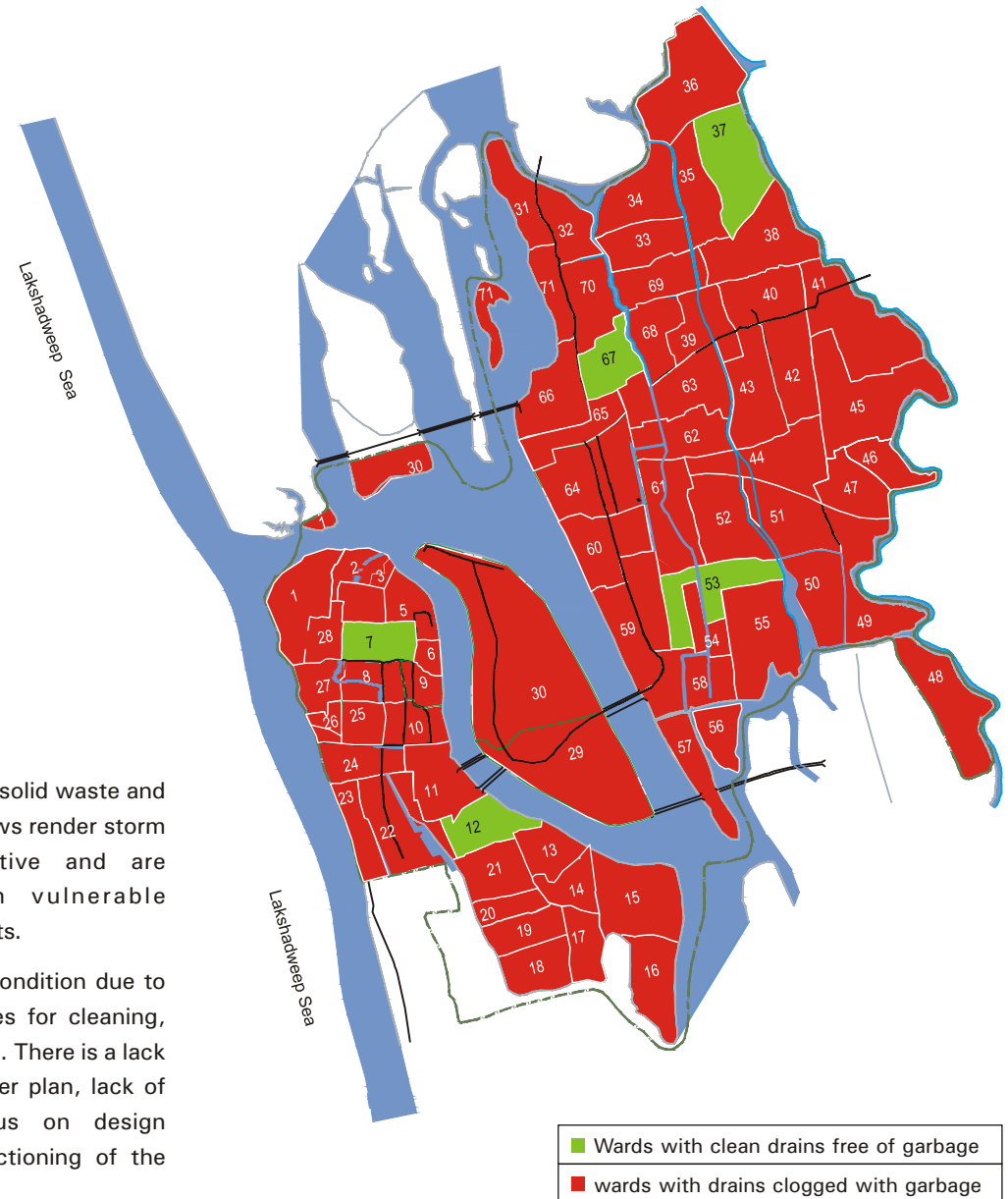


Figure 23: Map showing condition of drains at ward level

**SANITATION COMPONENTS**



**e) Solid Waste Management**

In 2007, the Kochi Urban Agglomeration generated approximately 600 tons per day of solid waste. The figure indicates source-wise solid waste generation at the corporation level. Solid waste is generated by a variety of sources, ranging from households, to commercial establishments, public and institutional areas.

Kochi’s municipal solid waste is being collected at the household level in bins (segregated). The collection of waste from households is carried out by workers belonging to different groups like self-help groups under the banner of Kudumbashree (self-help groups Govt. of Kerala program), Resident Welfare Associations and Kerala Builders Forum (KBF), Rotary Club, NGOs, etc. The CoC has provided 2 coloured bins, a green one with a 15-litre capacity, for biodegradable waste, and a white one with a 10-litre capacity, for dry waste) to all households. It is estimated that the waste from 36% poor households, 24% LIG households and 30% MIG household areas are collected by NGOs, private sector and Kudumbashree groups. The secondary collection and transportation of the waste is done by CoC.

Kochi has undertaken two initiatives to facilitate solid waste collection and poverty alleviation,

called “CREDAI Clean City Movement” and “The Don Bosco Initiatives”.

There is a solid waste charge, which is 2% of the property tax and is collected along with the property tax. There are also user charges that are collected at the rate of Rs 30 per household and Rs 50 per commercial establishment. The present door to door (DtD) collection from each household ranges from INR 40-60/ Month. For commercial establishments it would be in the range of INR 60-80/month.

The transportation system consists of 40 large open trucks at the CoC, 2 covered trucks, 30 three wheelers, 35 small four wheelers and 264 hand-carts/wheels barrows. The solid waste from the secondary collection points is transported to the Brahmapuram site (37.3 acre) which has a solid waste treatment plant, at a distance of approximately 20 km from the city centre. The site has the capacity to process 200 tonnes of mixed waste via mechanical composting and 50 tonnes of organic waste via vermicomposting daily In April 2010, the refuse-derived fuel (RDF) plant was inaugurated at the Brahmapuram plant.

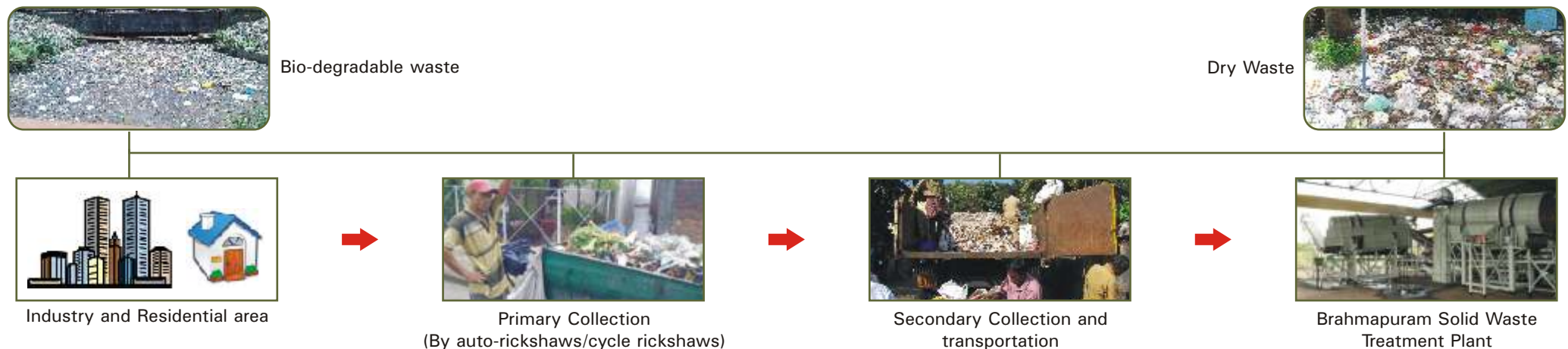
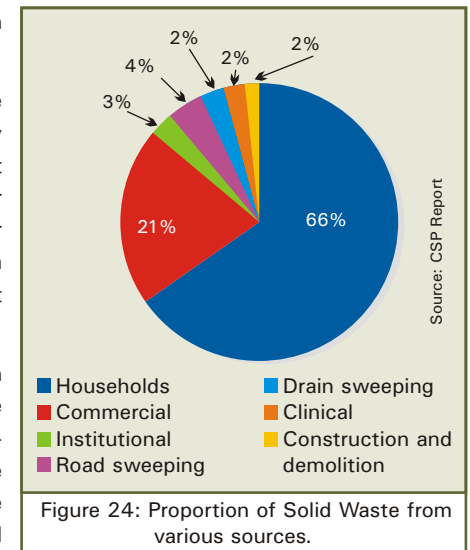


Figure 25: Schematic Representation of Solid Waste Management in Kochi.

**SANITATION COMPONENTS**



**Strengths**

1. Door to door collection in residential areas through self help groups that links service delivery to lively hood options.
2. Presence of source segregation mechanisms.



**Opportunities**

Current system of door-to door collection and segregation and transportation can be further optimised and coverage increased, making Kochi bin-free.



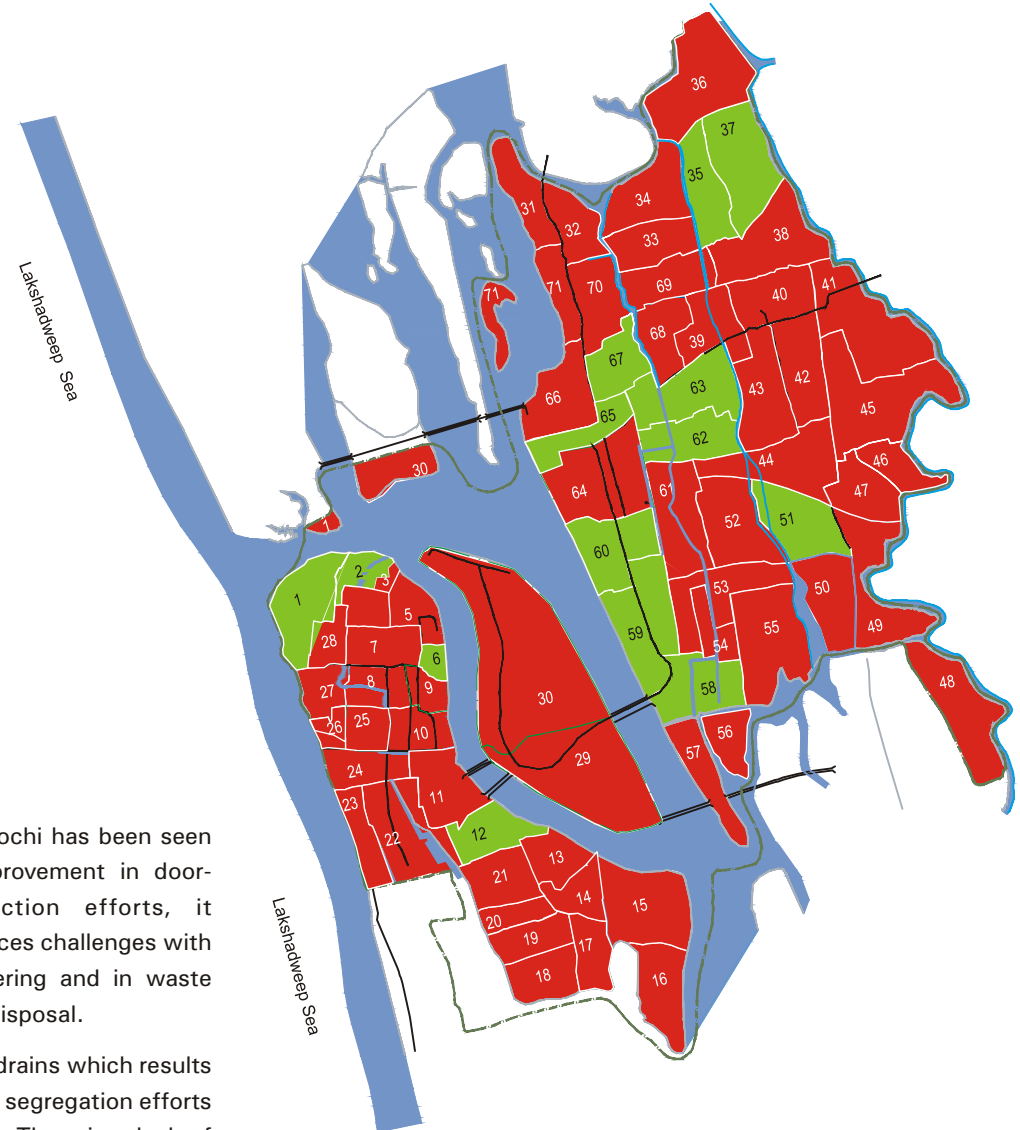
Figure 26: Poor Solid Waste Management



**Issues**

Even though Kochi has been seen significant improvement in door-to-door collection efforts, it continues to face challenges with respect to littering and in waste recovery/safe disposal.

There is littering, on roadsides and drains which results in clogging. The coverage of source segregation efforts need to be widened and sustained. There is a lack of mechanisms to track user charge collection at CoC which constrains analysis of cost recovery levels and attaining O & M cost recovery objectives.



■	Wards without open dumping of solid waste
■	Wards with open dumping of solid waste

Figure 27: Map highlighting open dumping of garbage at ward level.



## SANITATION COMPONENTS



### f) Governance and institutional framework

The CoC was formed in 1967, by merging three municipalities, Fort Kochi, Mattancherry and Ernakulam. The vision behind constituting CoC was to accommodate the projected population growth and urban expansion in the region by a holistic and integrated approach of City planning. The CoC is responsible for providing basic infrastructure and other civic services within its jurisdiction. Apart from the CoC, a number of state level agencies are involved in planning and providing urban services within Kochi city. The institutional framework for urban services includes state level agencies (i.e. Kerala water authority, Greater Kochi Development Authority, Kerala public works department, Cochin Port) and various private sector organisations (CREDAI, FRAT and KBF).

Service delivery by the KWA and the relationship between the KWA and the CoC is governed by a tripartite MoU signed in November 2007, between the CoC, KWA and the Departments of Local Self Government & Water Resources, GoK. This Memorandum of Understanding (MoU) seeks to develop a governance framework including mechanisms for accountability between the parties through performance agreements for water supply and sewerage service delivery projects under the JNNURM, UIDSSMT supported by the MoUD, Gol and the Kerala Sustainable Urban Development Project supported by the ADB.

#### Neighbourhood systems and community management:

The State Poverty Eradication Mission (SPEM) of Kerala, also known as Kudumbashree (means prosperity of the family), is a holistic, participatory, women-oriented poverty reduction programme. GoK implements it with the active support from Gol and NABARD.

Kudumbashree programs are designed on a participatory approach. The women members at the grass root level are encouraged to take up leadership through functional activities like Community Health Volunteers, Income Generation Activities Volunteers, Infrastructure Volunteers, Secretary and President. These groups prepare periodical micro plans, which become the base for the Community Development Society (CDS) plan or antipoverty sub-plan of the local body. Based on the local body's approval, the CDS societies take up the sanctioned work. The project officer of Kudumbashree in CoC carries out the actual implementation of poverty eradication programs with support from the municipal staff in the Health Department.

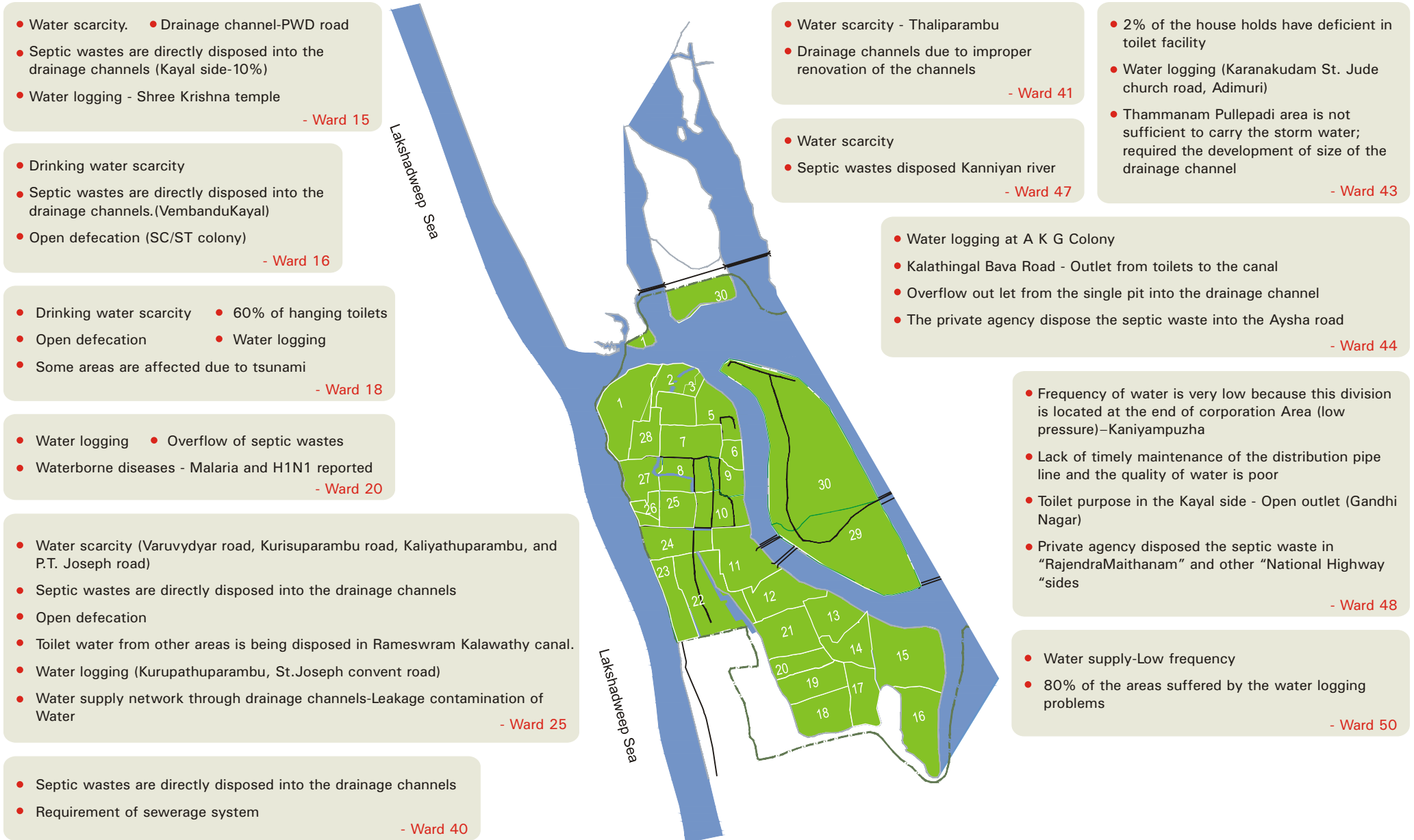
Urban Services	Planning	Implementation	Operation and Maintenance	Tariff fixation
Water Supply	KWA	KWA, Cochin Port Trust (for Port areas)	KWA, Cochin Port Trust (for Port areas)	KWA
Solid Waste Management	CoC and other local bodies	CoC and other local bodies	CoC and other local bodies, private sector initiatives like CREDAI Clean City Kochi	CoC
Storm Water Drainage	CoC, other local bodies	CoC Engineering Department (construction), Kerala Public Works Department, CoC	CoC and Kerala Public Works Department	Not applicable
Sewerage and Sanitation	KWA, CoC	KWA, CoC, Cochin Port Trust (for Willingdon Island), and other local bodies	KWA, Cochin Port Trust (for Willingdon Island), and other local bodies	KWA



#### Issues

**Overlaps in responsibility within CoC and across GoK agencies lead to diffused accountability**

Though urbanization has spread beyond CoC limits into neighbouring areas, long-term planning is constrained by the presence of multiple agencies and ULBs. Since the organizations such as KWA and GCDA continue to be responsible for implementation of large capital projects, city level master planning, etc., CoC and other ULBs play a limited role in planning for and implementation of key functions such as water supply and sanitation systems. Even within CoC, responsibility for sanitation is diffused across multiple departments, while SWM is being handled by the Health Department, procurement of vehicles is handled by Engineering section. Officials are also constrained by inadequate exposure to modern practices in water supply, sanitation and solid waste management as a result of which critical practices such as continuous water supply etc have not been adopted.



- Water logging - Kumranaswan road
- Water supply is limited in hours
- Water logging problem - Parabithara road
- Drainage channel blockage

- Ward 52

- Drinking water scarcity (Vidya Nagar, Kadavanthra areas and Girinagar)
- Open toilet outlet
- Drainage channel overflow (Parabithara road)

- Ward 53

- Kasthubanagar and some parts of Panambilly Nagar areas were originated by paddy field conversion
- Drinking water scarcity(Kadavathra)
- Water logging (surrounding areas in Koithara colony, Perandur canal and Ananthuruthy)

- Ward 58

- Drinking water scarcity
- Toilet waste outlet directly to drainage channels is common in whole the ward

- Ward 57

- Septic wastes are directly disposed into the drainage channels
- Water logging (Railway areas of the division)

- Ward 59

- Toilet waste outlet directly to drainage channels is common in whole the ward
- Water logging (eastern side of Chittur area, South railway station and Kalathiparabu)
- Drainage channels overflow severe in eastern side of general hospital, northern side of Siva temple.

- Ward 60

- 100 house holds don't have toilets
- Railway areas for open defecation
- Water logging problem
- Drainage channels are not properly maintained - Kammattipaadam area
- Bore well water is not suitable for drinking purposes due to salt water intrusion

- Ward 61



- Outlets are directly opens into the channels
- Waste disposal problems - T P Canal road
- Drainage channels are not properly maintained- T P Canal, Seenathodu and KaarnakodamThodu
- Water logging problem- BalanMenon Road and Kathrikadav-Kadavanthra road

- Ward 62

- Indhira Nagar areas toilet outlets are directly into the channels
- Water logging problems - Judges Avenue, Shenoy road and Ponnath Road

- Ward 63

- Water scarcity problems (A L Jacob road and its surrounding areas)
- Drainage overflow problems - 50% of the area
- Water logging problem - Whole division

- Ward 64

- Overflow of septic tanks during rainy season make some problems in this division
- No sewerage connection
- No public toilets

- Ward 67

- Overflow of septic tanks during rainy season make some problems in this division
- No sewerage connection
- No public toilets

- Ward 67

- Water scarcity - Kuruppamchira road and Ettukatt temple road
- Septic tanks were maintained by themselves
- No sewerage network
- Chengadampokthodu and Perandoorthodu outlets were directly into the open drainage channels
- During the rainy seasons these area peoples were suffered from flood
- In the Kuruppamchira and Chomeliparamb areas sanitation conditions are very poor

- Ward 69

### SANITATION COMPONENTS



#### g) Financial Sustainability

- ➔ The CoC moved from the cash based accounting and adopted the double entry accrual system of accounting from 1st April 2007
- ➔ CoC has maintained a positive surplus over the last three years.
- ➔ The income to expenditure ratio (~0.7) reflects the ability of the Corporation to cover and manage its finances.
- ➔ Property Tax contributes to half of the total income of the Corporation making it a significant source of income and shows increasing trend.

- ➔ Fees and User Charges continues to contribute as much as 10 percent to the total Income, however showing a declining trend.
- ➔ The dependence of the Corporation on Grants from the state / centre has been declining.
- ➔ Establishment expenses which includes the salaries, wages and allowances paid constitutes as much as 38-46% of Total Expenditure
- ➔ The O&M expenditure has shown a declining trend over the last 3 years. On the contrary, payments towards interest / loans indicate a increasing trend, requiring a consistent savings
- ➔ Nearly 75% of the O&M expenditure is towards repairs & maintenance, indicative of the quality of the existing infrastructure system.

#### Summary of Financial Indicators

Financial Indicators	2007-08	2008-09	2009-10	Benchmark	Remarks
Expenditure / Income Including Depreciation	0.7	0.81	0.68	Less than 1	Favourable
Expenditure / Income Excluding Depreciation	0.69	0.79	0.66	Less than 1	Favourable
Growth Rate – Income		-1%	-8%		Concern
Per capita Income	1,651	1,619	1,476		Concern
Per capita Tax Income	729	789	1,112		Favourable
Own Source Income / Total Income	61%	62%	93%		Favourable
Own Source Income / Grants	1.5	1.6	12.1	More than 1	Favourable
Capital Utilization Ratio[1]	1.2	1.2	0.8	1	Not Satisfactory
Property Tax / Total Income	29%	30%	52%		Favourable
Property Tax Collection Efficiency	64%	54%	92%	More than 95%	Not Satisfactory
Growth Rate – Expenditure		13%	-23%		Favourable
Per capita Expenditure	1,164	1,310	1,007		Favourable
Own Income / Total Expenditure	86%	76%	137%	More than 50%	Favourable
O&M / Total Expenditure	31%	28%	26%		Favourable
Management expenses / Total Expenditure	43%	49%	54%		Concern
Management expenses / Total Income	31%	40%	37%	Less than 25%	Not Satisfactory
Repairs & Maintenance on Drainage / Total Expenditure	5%	3%	4%		Concern
Repairs & Maintenance on Public toilets / Total Expenditure	0.02%	0.00%	0.05%		Favourable

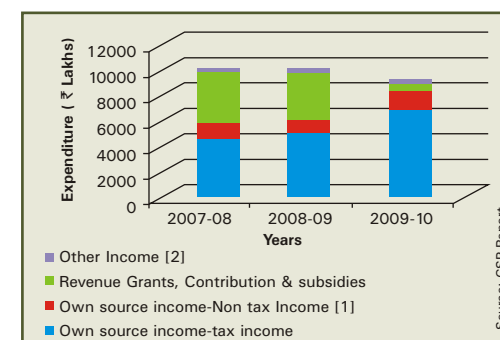


Figure 28: CoC's income statements

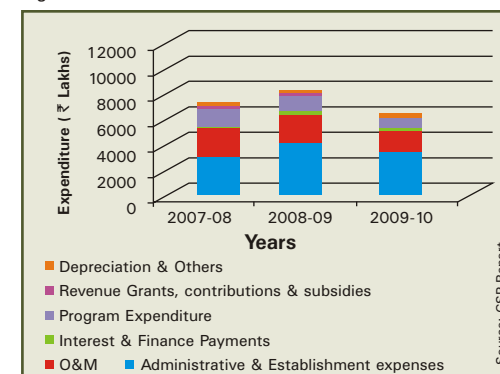


Figure 29: CoC's expenditure statements

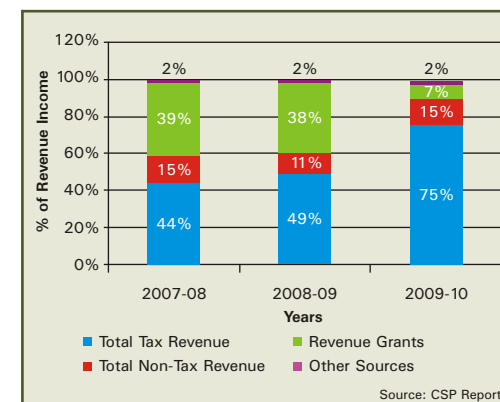


Figure 30: Composition of Revenue Income

Revenue from own income sources account for 91% share in total revenue Income



**CITY-LEVEL GOALS:** Identification of goals under the guidelines of NUSP and the accomplishment of the same would make Kochi 'a completely sanitised city'.



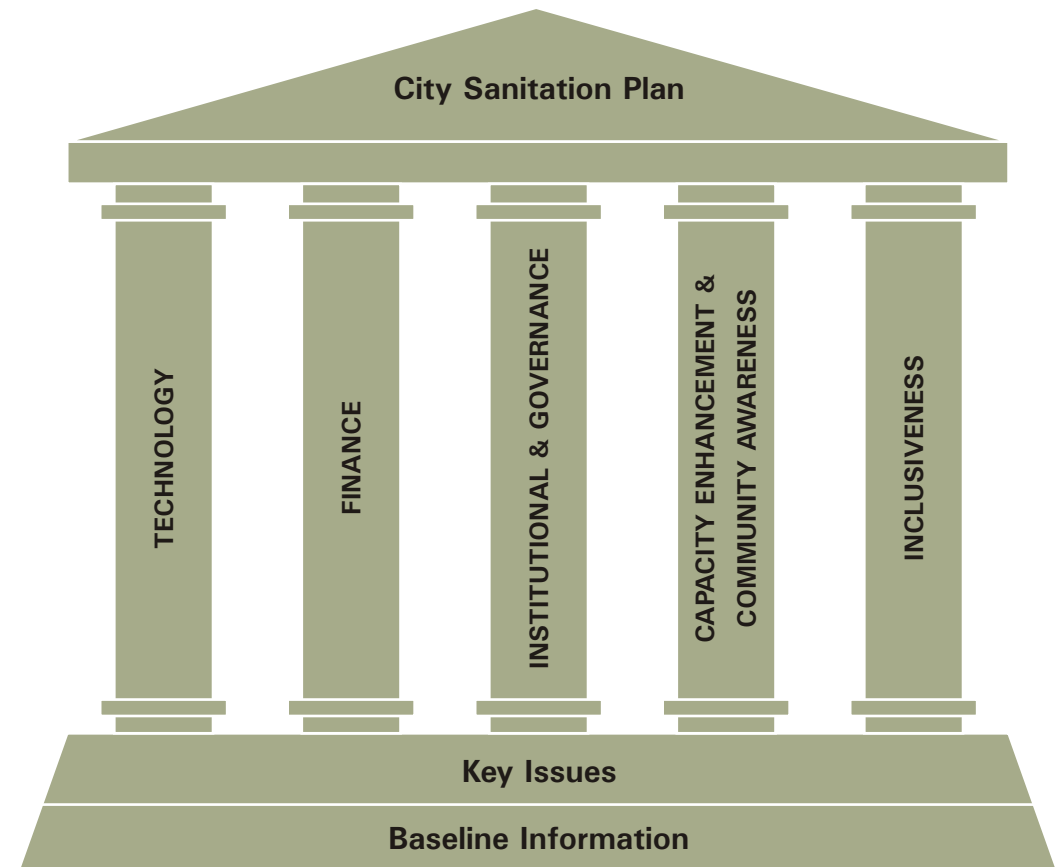
**CITY-LEVEL KEY ISSUES:** Critical issues are identified at ward level, zone level, and across various economic levels (urban & urban poor). The affected areas are characterized and prioritized for immediate intervention.





**RECOMMENDATION FOR KEY ISSUES:** Focused recommendations to address each key issue are designed. These recommendations are given in terms of technology required, costing, institutional and governance enhancement, community awareness and inclusiveness.



**ACTION PLAN:** Specific action plans are designed across the five plan components (access to toilets, wastewater management, river pollution and storm water management, water supply, solid waste management), and major strategic support components (governance and institutional frame work and financial sustainability). These action plans are packaged around five pillars of intervention.



The city sanitation plan recommends an action plan in two time horizons Planning Horizon spanning 30 years (2012-2041) and action horizon spanning 10 years (2012-21)

 <p><b>Planning Horizon (30 years: 2012-2041)</b></p> <p>The Planning Horizon considers a period of 30 years from 2012 to 2041, and involves planning for an Intermediate Stage (2021 or 10 years) and an Ultimate Stage (2041 or 30 years). This Time Horizon is consistent with typical timeframes for planning infrastructure asset creation, and preparation of detailed project reports.</p>	<p><b>Action Horizon (10 years 2012-21)</b></p> <p>The Action Horizon considers a period of 10 years from 2012 to 2021 and is the time frame for the actions recommended. This Action Time Horizon is further divided into actions along Short Term – (3 years) Medium Term - (5 years) and Long Term - (10 years).</p> 
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This document indicates time frame for action plans in the following sectors, which will collectively help Kochi in becoming a fully sanitised city.

 <p>Governance and Institutional Framework</p>	<p><b>C S P</b></p>	 <p>Financial Sustainability</p>
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 <p>Access to Toilets</p>	 <p>WasteWater Management</p>	 <p>Drainage network and natural drainage</p>	 <p>Water Supply</p>	 <p>Solid Waste Management</p>
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### 1: Access to Toilets

Kochi has good coverage in terms of access to toilet but the major issue of concern is open defecation which is although rare but prevalent in some low income pockets. To eradicate this issue CoC should initiate following actions:

- ➡ Implement an **Inspection and Monitoring protocol** to ensure timely maintenance and consistent service delivery in existing toilets.
- ➡ Provide adequate enforcement mechanisms to ensure that the migrant labour camps and construction sites are provided with toilets and other sanitation facilities.
- ➡ Develop and implement a **City-wide Toilet Development and Rehabilitation Plan** to eliminate open defecation and open urination within three years. This Planning effort should be followed with **time-bound Implementation** with possible prioritisation as suggested below:

a) Provision of Community Toilets in slums/wards with high OD prevalence

b) Provision of Public Toilets in commercial areas with high floating population

c) Provision of Public Toilets in other areas progressively to achieve a target standard (say access within every 500 m of reach in arterial roads and in commercial areas across the city)



#### Monetary Requirement:

Based on a normative assessment, an estimated 87 community toilet blocks and 217 public toilet blocks are needed in the medium term involving a capital investment of ₹ 30 crore

- ➡ Dedicated **budget** for toilet development and maintenance expenditure. CoC should actively mobilise revenues through **pay-per-use** and **advertising** to achieve full cost recovery for Public Toilets. Development of Community toilets may require subsidization even though community-led maintenance with monthly fees from user households can help CoC address O&M cost recovery. Streamlining the procurement process for outsourcing of O&M.
- ➡ Initiate **awareness campaigns** to facilitate awareness, usage and ownership of shared community toilet facilities among **slums**.
- ➡ Implement and enforce **byelaws to levy fines** for open defecation/urination and should incorporate toilet **specifications in Building regulations** (in consultation with the Government of Kerala (GoK)).



Figure 31: CTC near Mattancherry

## 2. Waste Water Management

The issues requiring attention in this sector are negligible sewerage coverage, ground water pollution due to excessive use of septic tanks and inadequate regulation & oversight of onsite sanitation and septage management. To address these issues CoC should initiate following actions:

### I. To increase the sewerage coverage

➡ To streamline and implement DPRs for conventional sewerage system following tasks should be undertaken:

a) Conduct a **comprehensive review of DPRs** for conventional sewerage system

b) Undertake an **awareness and stakeholder engagement initiative** to allay concerns of local stakeholders such as Residents Welfare Associations that have been protesting against implementation.

c) Review the additional oversight and monitoring requirements in the context of technical challenges and additional expertise required to handle these highlighted challenges in executing the projects

➡ CoC and KWA should initiate revision and updation of the **Sewerage Master Plan** for implementing a waste-water management solution for Kochi which considers conventional as well as other decentralised options.



### Monetary Requirement:

Investment requirements on the basis of normative estimates for improving waste water management works to ₹ 300 crore.

➡ CoC along with KWA should conduct a feasibility study to evaluate implementation of a **hybrid waste-water management** infrastructure in the city, one that attempts to address and manage **black and grey water** separately.

a) In the immediate term, create facilities for receiving and treating septage

b) In the medium term, upgrade soak pits and septic tanks to onsite waste-water systems that conform to minimum standards and are water sealed and leak proof to avoid groundwater contamination. Use them as interceptor tanks along with shallow bore systems connected to transport black water from septic tanks to Local Service Centres / Treatment facilities

c) Progressively develop separate networks to handle grey water which can be routed along storm drain networks to LCS or to large Urban Service Centres for Treatment and disposal. The various LCS could be in turn connected through sewer networks to larger Treatment Plants or Urban Service Centres where secondary and tertiary treatment options can be implemented

### II. To control ground water pollution due to prevalence of septic tanks:

➡ CoC and KWA should immediately conduct a feasibility study and implement facilities to receive and treat septage on a priority basis.

➡ CoC has to empanel service providers, provide capacity building and ensure compliance to safety, health and environment practices in septage management and onsite sanitation.

➡ CoC should conduct a comprehensive household sanitation survey on priority to collect information on waste-water flows and other sanitation indicators at a household level.

➡ CoC should develop, clarify, deploy, and enforce byelaws for monitoring and regulation of septage management and on-site sanitation. A set of well-defined bye-



➡ laws and guidelines, accompanied by rules for on-site sanitation and septage management should be adopted and enforced by CoC in consultation with and assistance from GoK.

III. Implement the bylaws for reuse and recycle of waste water.



**Monetary Requirement:**

Investment requirements on the basis of normative estimates for improving waste water management works to ₹ 420 crore.



Figure 32: Hi-rise buildings-Inhouse Sewage Treatment facility



Figure 33: GCDA Sewage Treatment Plant at Marine Drive

### 3. Drainage network and natural drainage

The clogging of storm drains due to solid waste and waste water disposal is the main issue of concern in this sector. To address this issue, NMC should initiate following actions:

- ➡ CoC in consultation with the GoK should prepare a comprehensive city wide Drainage Master Plan that covers

a) Review of the status and efficacy of primary and secondary drainage in Kochi urban agglomeration to identify interventions to rehabilitate / develop them given city topography and water flows

b) Run-off management strategy at a regional / zonal level including identification of low-lying areas where gravity based flow is limited and pumping maybe required to address water logging

c) Network Zoning and phasing for implementation of a comprehensive area level drains across the city to achieve SLB norms for storm drains within CoC

- ➡ Based on priorities identified in the drainage master plan, CoC in consultation with GoK should coordinate **preparation of DPRs** to implement a phased investment program to rehabilitate the drain network.

- ➡ Given that the drain network is being executed and maintained by multiple agencies including Concerned local bodies including CoC, Irrigation Department and Public Works Department, **GoK should clarify responsibility** for development and O&M of these networks (including earmarking adequate budgets for the same) among the various agencies.



Figure 34: Clogging of storm drains



#### Monetary Requirement:

The normative capital cost estimates for storm water area drains works to ₹ 230 crore over the next 10 years

#### 4. Water Supply

The issue of concern in this sector is inadequate information, poor service delivery and poor cost recovery in the field of water supply. The action plan to address this issue is:

- ➡ CoC /KWA should undertake **installation and maintenance of Bulk Meters** and record water flows at Intake points, Treatment Plants, Storage and Pumping points.
- ➡ Given that KWA has already adopted universal metering, it should undertake immediate steps to put in place **processes for regular meter reading** and **periodic repair/maintenance of meters** to effectively implement volumetric tariffs with a view to improve cost recovery.
- ➡ KWA should develop a **Water Supply Master Plan** for Kochi urban agglomeration, followed by **DPRs** to implement a phased investment program to achieve SLB norms within CoC in the medium-long term.
- ➡ KWA should track and report costs for service provisioning in CoC area and implement a Water Tariff Policy to clarify cost recovery objectives and set mechanisms for tariff fixation /revision to achieve 100% O&M cost recovery.
- ➡ Encourage Rain water harvesting at household level.



Figure 35: Poor service delivery of water supply



#### Monetary Requirement:

Investment requirements on the basis of normative estimates for improving water supply service delivery works to ₹ 158 crore.

## 5. Solid Waste Management

Kochi's solid waste management issue includes Littering on roadsides and drains. To address this issue CoC should initiate following steps:

- ➡ Strengthen on-going efforts on **door-to-door collection and source segregation** to effectively eliminate road side littering and dumping of waste in drains.
- ➡ Initiate a **feasibility study** to evaluate measures for mitigating pollution and environmental concerns at existing facility and/or evaluate alternate sites /options for waste processing in view of recent concerns over the waste processing/ landfill facility at Brahmapuram. This should be followed up with **preparation and implementation of a DPR** on proposals identified in the feasibility study.
- ➡ Initiate actions to clarify and achieve cost recovery objectives in light of CoC's reform and cost recovery commitments under JNNURM.
- ➡ In the medium term, CoC should set up a dedicated SWM department to facilitate single-point accountability carved out of the current health and engineering departments.
- ➡ CoC should encourage and support local initiatives such as the CREDAI Clean city initiative and engage local stakeholders and community participation in monitoring and oversight of SWM activities.



### Monetary Requirement:

An SWM project involving a total approved cost of ₹ 88.12 crore is under implementation under JNNURM. Additionally a DPR involving an estimated cost of ₹ 10.3 crore for procuring equipment and launching awareness campaigns is also under implementation.



Figure 36: Littering in drains

## 6. Governance and Institutional Framework

The Kochi's governance and institutional framework has one main issues of diffused accountability. To address this issue two way approach would be required from GoK and from CoC.

### GoK should undertake following actions:

- ➡ Formulate and disseminate a **state-level Sanitation Strategy**.
- ➡ CoC should create a **Coordination committee** to jointly coordinate infrastructure planning and service delivery and to clarify responsibility for various aspects of water and sanitation.
- ➡ Support ULBs in implementing local level policy framework through **model bye-laws and guidelines**. Illustrative areas for formulation of such model guidelines are listed below:

#### Subjects for guidance manual:

Public Toilets configuration, sizing and operation  
Building Regulation: Toilet sizing and specifications as part of Building Code.

#### Subjects for Bye-Laws:

Ground water management and Rainwater Harvesting  
User charges Regulation, Fixation and Revision  
Citizen Obligations, Penalties for littering and waste dumping  
Onsite sanitation, decentralised treatment and septage management

- ➡ Undertake an organisation assessment of CoC to identify the number and scale of officers required and detailing of job descriptions and drafting/amendments to service rules as necessary. The following actions may be considered as part of this organisational review and restructuring exercise.

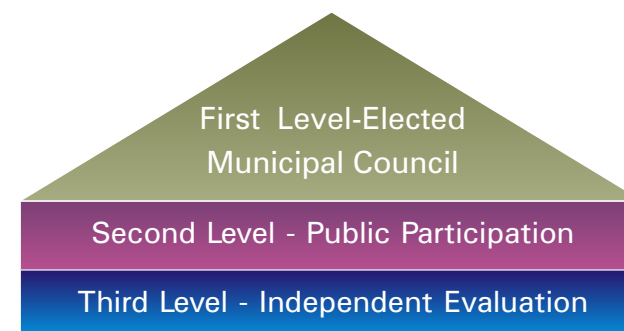
a) CoC and KWA should strengthen the zonal offices and improve the information flow at ward, zonal and ULB level.

b) **Organisational restructuring:** CoC should eventually align all sanitation activities under a **Sanitation** department to provide dedicated accountability for all Sanitation activities covering a) shared toilet access, b) Solid Waste Management and c) Storm drains and water bodies Expedite action to fill all the vacancies.

c) The Revenue and Accounts functions that are currently handled separately should be integrated and handled as a centralised **Finance** department

### CoC should undertake following actions:

- ➡ Should, with immediate effect, signal taking primary oversight on on-site sanitation through creation of a separate department for onsite sanitation.
- ➡ In order to strengthen monitoring and oversight of sanitation activities, CoC should consider implementing a **three level monitoring and evaluation framework** on the lines suggested below:



### 7: Financial Sustainability

The inadequate information on the cost of sanitation affects CoC's financial sustainability. To address this issue CoC should implement following action plan:

- ➡ A normative assessment of capital cost estimate across various sanitation components is presented below. The estimated cost required over the next five years is estimated to be ₹ 750 crore with priority investments in Access to Toilets, Water Supply, Sewerage and Information Systems Improvements.
- ➡ Rationalise user charges in SWM to meet its reform commitment of 100% O&M cost recovery.

- ➡ KWA should ring-fence its costs of service provision in the CoC area and maintain cost and revenue information in synchrony with CoC level supply to enable it review and rationalise tariffs and cost recovery in line with the actual cost of supply.
- ➡ Implement specific actions recommended in the CSP to improve penetration of water and sewerage connections, cost recovery and collection efficiency and levy of user charges.

**Capital Investment estimate and possible phasing (Figures in Rs. Lakh)**

Capital Investment (Rs. Lakh)	Phasing of Investment			TOTAL
	Short	Medium	Long	
Access to Public and Community Toilets	2,942	-	396	<b>3,338</b>
Water Supply	400	5,000	10,400	<b>15,800</b>
Waste water management	5,000	18,000	30,000	<b>53,000</b>
ISIP, Project Development and Capacity Building	1,650	800	500	<b>2,950</b>
<b>TOTAL</b>	<b>9,992</b>	<b>23,800</b>	<b>41,296</b>	<b>75,088</b>



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3. **Mrs. Bhadra**, Deputy Mayor, Corporation of Kochi, Kochi - 682011
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5. Health Officer, Health Department, Corporation of Kochi, Kochi (Nodal Officer for CTF/CSP)
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## About GIZ

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation) changed its name to The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on 1 January 2011. It also merged with among others, InWEnt – Capacity Building International, Germany.

It is owned by the German Government and works in the field of international cooperation for sustainable development. GIZ is also engaged in international education work around the globe and currently operates in more than 130 countries worldwide.

## GIZ in India

Germany has been cooperating with India by providing expertise through the organisations now forming GIZ for more than 50 years. GIZ's joint efforts with the partners in India are addressing India's priority of sustainable and inclusive growth.

