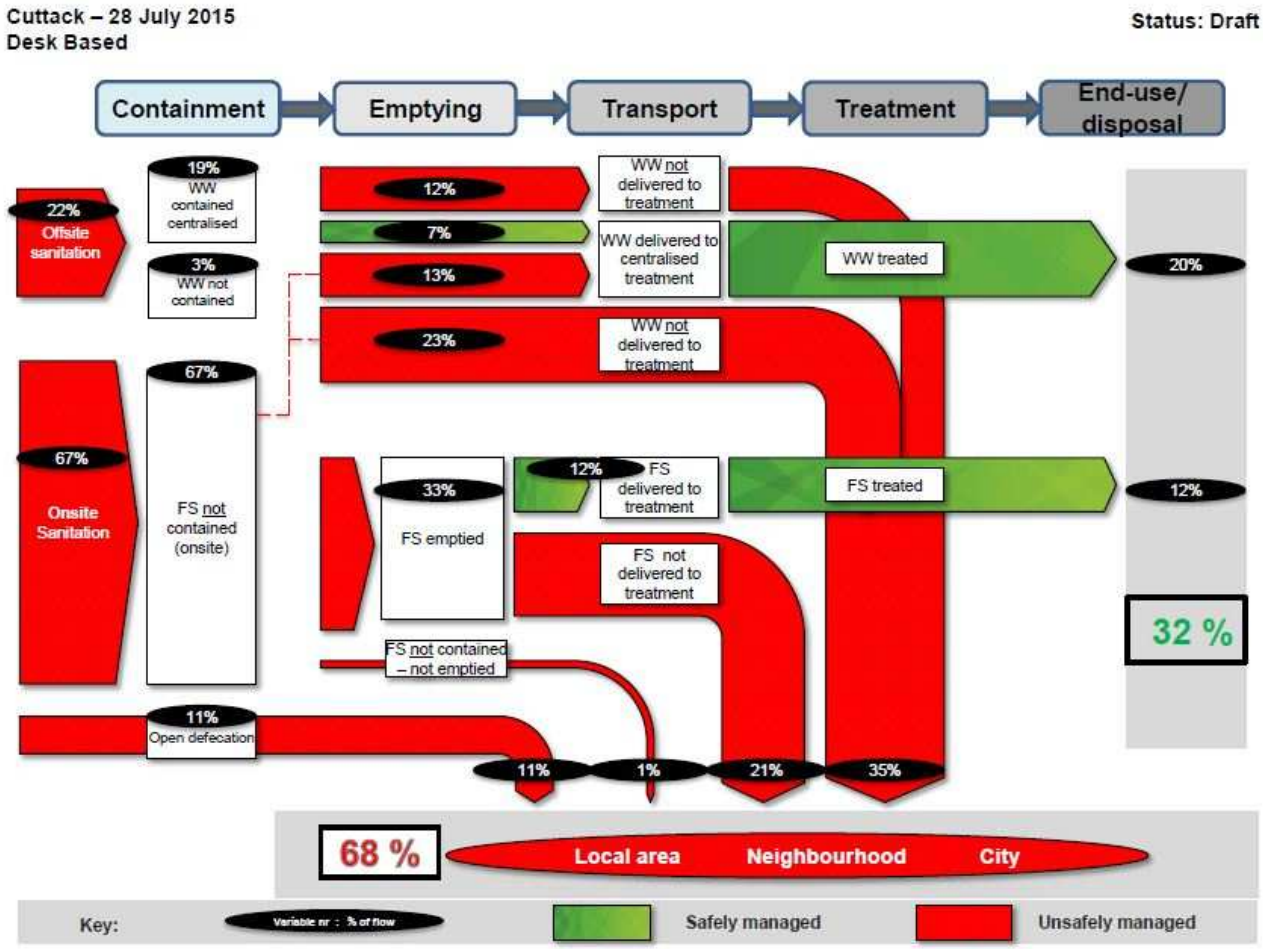
1. The Diagram



2. Diagram information

Desk or field based:
This is an desk based SFD

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This is a draft SFD

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3. General city information

Cuttack city, lies in east coast plains of India, is the former capital and one of the oldest cities of Odisha, established in 1876 as municipality. It is the district headquarter and is situated at a distance of about 25 km to the north of Bhubaneswar, the present capital of Odisha. The city is surrounded by the rivers Mahanadi, Kathajori, Birupa and Kuakhai (CSP, 2011).

The population of city, as per the 2011 Census is 606,007 persons. Thedensity of city is7,769 persons per sq.kmwhich is very high when compared to the state density of 269 persons per sq.km. Total slum population is 223,619 which is 41.78% of the total population (CSP, 2011).

Municipal boundary has been chosen for the current study.It comprises of an area of 192.5sq.km (CSP, 2011).

Cuttack is completely dependent on ground water for water supply. Ground water level is 6 mbgl (CSP, 2011).

4. Service delivery context

In 2008, the Ministry of Urban Development (MoUD) issued the National Urban Sanitation Policy (NUSP). The policy aims to: raise awareness, promote behaviour change; achieve open defecation free cities; develop citywide sanitation plans; and provide 100% safe confinement, transport, treatment and disposal of human excreta and liquid wastes. The NUSP mandates states to develop state urban sanitation strategies and work with cities to develop City Sanitation Plans (CSPs). Furthermore, it explicitly states that cities and states must issue policies and technical solutions that address onsite sanitation, including the safe confinement of faecal sludge (USAID, 2010).

The objectives of NUSP are to be realized through CSPs and state sanitation strategies. As of now there are very few cities which have finalized their CSPs, and those plans are also not implemented. This remains a major drawback in implementation of NUSP.

The advisory note on septage management in urban India, issued by MoUD in 2013, recommends supplementing CSPs with Septage Management Sub-Plan (SMP). Still septage management in India is not prominent due to lack of knowledge, consideration of septage management as an interim solution, lack of sufficient funding and many other socio-political issues.

There are no specific legal provisions relating to septage management, but there are a number of provisions relating to sanitation services and environmental regulations, which majorly stems from, The Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Acts. Municipal acts and regulations usually refer to management of solid and liquidwastes but may not provide detailed rules for septage management (MoUD, 2013). Still corporation caters to emptying service though the disposal is done in open drains only.

5. Service outcomes

Overview on technologies and methods used for different sanitation systems through the sanitation service chain is as follows:

Containment:There is limited sewerage network which conveys waste water to two main open drains flowing through the city. The city is majorly dependent on septic tanks which are generally not adhering to design prescribed by Bureau of Indian Standards (BIS). The effluent from the septic tank flows into open drains. Some households are also connected to pits.
Emptying: Most of the emptying work is done mechanically but there are some instances of manual emptying. Even though more than 60% of city's population is dependent on onsite sanitation systems (OSS), the municipal corporation is not willing to take the full responsibility of septage management and prefers underground sewerage system.

Transport: The total sewage of city is conveyed totwo main open drains, through sewage network and smaller open drains. Septage is generally transported through vacuum tankers of 3000 litres capacity. There are 3 tankers with the corporation and some private emptiers are also plying their tankers in the city.

Treatment:A 33 MLD Sewage Treatment Plant (STP) is located in Matagajpur. Oxidation ponds are used to treat around 38% of sewage which is tapped from open drains and treated at STP. There is no existing septage treatment facility.

End-use/Disposal: Treated and untreated waste water is disposed in downstream of Khatjodi River. Septage is disposed in open drains.

Figure 1:Open drain in the heart of the city (Source: Shantanu/CSE, 2015)

According to Census, 22% of City is dependent on offsite systems,population connected to sewer line is 19% and user interface discharging in open drain or ground is around 3%.

Rest of the 67% of the city is dependent on OSS, out of which 64% is dependent on septic tanks and 3% on pits. The public latrines are connected to septic tanks and hence are incorporated in OSS.Faecal sludge(FS) from OSS is not contained as the septic tanks are connected to open drains and pits are polluting the ground water.

There is no clear differentiation between percentage of effluent and septage generated from septic tanks, hence it's assumed to be 50% each. Therefore, 33% of FS, which is effluent goes into open drain and rest is emptied from tanks whenever full. Some FS is always left in the tanks and is assumed to be 1%.

All the sewers, open drains, and FS emptied ends up in two main drains flowing through the city. The STP is situated at the lowest point of the city which taps about 38% of the waste water flowing in the drains, hence it is assumed that 38% of all the FS emptied, wastewater transported through sewers and open drains is treated, rest of it goes untreated in the river, and hence shown unsafe in SFD. 11% of city which defecates in open is also shown unsafe in SFD.

6. Overview of stakeholders

The 74th Constitutional Amendment Act of 1992 reformed the sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to Urban Local Bodies (ULBs). This transfer has resulted in a variety of implementation models, as well as lack of clarity in allocation of roles and responsibilities between state and local agencies, which sometimes results in large gaps in implementation (USAID, 2010).

The following stakeholders are responsible for sanitation service deliveryin Cuttack

Key Stakeholders	Institutions / Organizations
Public Institutions	Odisha Water Supply and Sewerage Board (OWSSB), Public Health Engineering Organisation (PHEO), Cuttack Municipal Corporation (CMC), State pollution control board (SPCB)
Private Sector	Private emptier

Table 1:Key stakeholders (Source: Compiled by CSE,2015)

OWSSB is responsible for planning and executing sewerage schemes. PHEO is responsible for operation and maintenance of sewerage network. CMC is responsible for operation and maintenance of opendrains, construction and maintenance of public toilets, septage management. They also regulate private emptiers. Private emptiers are responsible for septage management. There are two licensed emptiers in the city. SPCB is responsible for monitoring and evaluation of STPs.

7. Credibility of data

Two key sources of data are used; Census of India, 2011 and draft of CSP, 2011. Most of the data isthen updated by Key Informant Interviews (KIIs).Five KIIs have been conducted with different stake holders.

Data on containment is available in Census. Data on emptying and transport is collected by KIIs. However most of the data is qualitative.

Some of the issues and challenges are listed below:

- Data insufficiency & non availability:
  - No data available on how many septic tanks are connected to open drains
  - No data on waste water generated from commercial hubs, institutions etc.
- Accuracy: Discrepancy observed between Census data and actual ground situation
- Data available at different time lines
- Limited data available on reuse (formal / informal)

Assumptions followed for preparing SFDs:

- Data provided by Census, 2011 is correct
- Septic tanks and sewer connections on ground are as per septic tanks & sewer connections defined in Census
- Volume of waste water generated is 80 % of water supplied
- All septic tanks are connected to open drains
- 90% of the people get their tanks emptied when full

8. Process of SFD development

Data is collected through secondary sources, and then a visit to the city is done to conduct KIIs with relevant stakeholders, to fill in the gaps in data and to crosscheck the data collected.

To start with, a relationship between sanitation technologies defined in Census of India and the ones defined in project is established.

The data is fed into the calculation tool to calculate the excreta flow in terms of percentage of the population.

32 % of city is managing its excreta safely as there's some treatment happening at STP, but excreta of rest of the 68% of the city is not managed safely, as it goes untreated into the river through open drains, this also includes 11% of the city which defecates in open.

Limitations of SFD:
It's dependent on secondary data and true picture of the city may differ.

The data available is at different timelines, for example data on containment is from census 2011, and data on emptying and transportation is collected through KIIs conducted in 2015.

Whether excreta is safely managed or not is dependent on whether the system is contained or not, and not on whether waste is safely handled.

9. List of data sources

Below is the list of data sources used for the development of SFD.

- Published reports and books:
  - Census of India 2011, House listing and Housing data, Government of India
  - Service levels in water and sanitation sector, MoUD, 2012
  - Excreta Matters- volume 2, Centre for Science and Environment, 2012
  - A Rapid Assessment of Septage Management in Asia, USAID,2010
- Un–published documents:
  - Draft CSP of Cuttack, Cuttack Municipal Corporation, 2011
- KIIs with representatives from :
  - Government agencies: CMC, PHEO, SPCB,OWSSB
  - Service providers:Private emptiers
  - Residents
- Websites/web links:
  http://moud.gov.in/cityplan

Cuttack, India, 2015

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