

# NATIONAL ACADEMIA CONCLAVE **URBAN SANITATION**



9<sup>th</sup> - 10<sup>th</sup>  
March 2019



CEPT University  
Ahmedabad



## PARTICIPANT KIT



NATIONAL ACADEMIA CONCLAVE   
**URBAN SANITATION**



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# Agenda of the Conclave

# Background

Sanitation Capacity Building Platform (SCBP) at NIUA has been engaging with Academic Institutes on Non-networked sanitation to introduce non-networked sanitation as an important emerging component of urban sanitation. Universities and academic institutes are best suited to integrate a conceptual and practical understanding of urban sanitation and waste water management challenges within the urban planning, engineering, architecture, management and social sciences domains - to provide the human resources in terms of fresh graduates, re-training and skill upgradation of on-the-job professionals, to address the problems of sanitation in the coming decade.

Under SCBP, C-WAS at CEPT University conducted Training of Trainers (ToT) in March 2018 for more than 20 recognized Universities. The faculties discussed key aspects of non-networked sanitation and designed a course outline for their institute. The workshop led to some universities agreeing to start studios and thesis work, others elective courses and rolling out certificate courses for professionals. Following this workshop, NIUA invited proposals from universities in May 2018 for initiating a range of work.

## Purpose of Conclave

Since August 2018, 9 partner Universities of SCBP have rolled out a range of initiatives to integrate urban sanitation agenda particularly non-networked sanitation in their course work: ranging from electives, studios, workshops, research, certificate courses. A meet of these institutes was proposed to discuss feedback, outcomes, and share learnings with each other.

Faculty of Planning, CEPT University shall host this 2-day National Academia Conclave on Urban Sanitation inviting faculties, sector experts and students from across Indian universities to facilitate a platform for a students and academia conclave, with the following purpose:

- ❖ Reflection of non-networked sanitation systems: Academia integration and ideas for next year
- ❖ Opportunity, incentive and platform for students to present, share, learn, explore ideas and work.
- ❖ Experts and academia cross-learning platform

## Number of Participants

- ❖ 45-50 faculties and sector experts
- ❖ 100+ students from SCBP partner universities, other invited universities and CEPT University.

## DAY 01 | March 09, 2019

### Urban Sanitation Immersion: One concept, many experiences

Timings	Session / Topic
<b>Session I - Inaugural Session</b> Venue: - Auditorium	
09:30 - 10:00	Registration
10:00 – 11:00	<ul style="list-style-type: none"> <li>❖ Lighting of lamp and welcome address</li> <li>❖ Summary of Academia Engagement in Decentralized Sanitation in 2018: Key Highlights</li> <li>❖ Academia engagement in sanitation at CEPT</li> </ul>
11:00 - 11:30	Tea Break + Group Photo
<b>SESSION II - Sanitation in Urbanizing India – Is there a right way?</b> Venue: - Auditorium	
11:30 - 12:15	<p><b>Panel: Prof. Jagan Shah, Mr. S. Vishwanath, Prof. Meera Mehta, Ms. Kavita Wankhade</b> <b>Moderated by Prof. Dinesh Mehta</b></p> <p>The Panel discussion will focus on sanitation challenges in urban peripheries and fast growing secondary cities, available and relevant approaches, local innovations, current programs, Plans and way forward. It intends to highlight complexities and contradictions in 'sanitation world' and show some bold directions. (followed by Q&amp;A)</p>
<b>SESSION III - Capacity building in Urban Sanitation - Role of Academia</b> Venue: - Auditorium	
12:15 - 13:00	<p><b>Chair: Prof. Jagan Shah, Prof. V K Phatak</b></p> <p><b>Presentation by faculties:</b></p> <ul style="list-style-type: none"> <li>❖ CoEP, Pune : Elective Course, Winter School and Faculty Development Program</li> <li>❖ XUMG, Xavier University : Certificate course on Management Aspects of Non- Networked Sanitation</li> <li>❖ Indus University, Ahmedabad : Sustainable Sanitation Systems - Role of Architects and Urban Planners</li> </ul>
13:00 – 13:15	Discussion and Q&A by Audience and Feedback by Session Chairs
13:15 - 14.30	Lunch Break
<b>SESSION IV - Sanitation technologies - What would work for cities?</b> Venue: - Auditorium	
14:30 - 15:15	<p><b>Panel: Mr. Dayanand Panse, Mr. Umamahesvaram Mandi, Prof. Bakul Rao</b> <b>Moderated by Mr. Mahesh Kumar Jat</b></p> <p>The Panel discussion will focus on technologies for wastewater capture-conveyance, treatment and reuse, appropriate scales of application, operational challenges and way forward. It intends to foster appreciation of locally relevant and operationally 'lighter' scales and options (followed by Q&amp;A)</p>
<b>Session V - Urban Sanitation Academic Studio Experiences</b> Venue: - Auditorium	
15:15 - 15:45	<p><b>Chair: Prof. Kavita Daryani Rao, Mr. S. Vishwanath</b></p> <p>Presentation by students:</p> <ul style="list-style-type: none"> <li>❖ GNDU, Amritsar</li> <li>❖ LPU, Punjab</li> <li>❖ CEPT University, Ahmedabad</li> </ul>
15:45 - 16:00	Discussion and Q&A by Audience and Feedback by Session Chairs
16:00 - 16:30	Tea Break

Timings	Session / Topic
<b>Session VI - It's not all about technologies: Public Health, Social and Legal aspects of Sanitation</b> Venue: - Auditorium	
16:30 - 17:15	<b>Panel: Prof. Sujith Koonan, Prof. Dileep Mavlankar, Mr. Rahul Banerjee</b> <b>Moderated by Prof. Sanghmitra Acharya</b> The Panel discussion will focus on public health considerations and monitoring, social and cultural stigma that drives the sanitation choice and legal aspects of safe sanitation. It intends to bring in appreciation for health, social and legal aspects of sanitation (followed by Q&A)
<b>Session VII - One Minute on Urban Sanitation</b> Venue: - Piraji Sagara Basement	
17:15 - 18:15	Jury: Prof. V K Phatak, Ms. Kavita Wankhade, Mr. Depinder Kapur, Mr. Vora Poster presentation on Urban Sanitation by students
<b>18:30 – 19:30</b>	<b>Cultural Evening @ CEPT South Lawns</b>

## DAY 02 | March 10, 2019

### Urban Sanitation Sandpit

Timings	Session / Topic
07:00 – 08:00	<b>Heritage Walk of UNESCO World Heritage City: Old City of Ahmedabad (Optional)</b> By CEPT Volunteers
<b>Session VIII - Hey Sanitation! Do we know you enough?</b> Venue: - Auditorium	
09:30 - 10:30	<b>Student Round Table: Reflections of Day 1</b> <b>Moderated by Prof. Ashwani Kumar, Ms Jyoti Dash</b> College representatives from participating colleges (5 minutes each)
10.30 - 13:30	<b>Group work – Understanding the urban sanitation challenges (Planning Charrette - Sandpit)</b> <b>Jury: Mr. S. Vishwanath, Prof. Mona Iyer, Mr. Depinder Kapur, Ms. Molly Grace</b> A pre-formulated Urban Sanitation problem will be shared with the groups, who will deliberate on various challenges including technical, operational, financial, institutional, legal, social challenges. Each group would be facilitated by Faculty mentors, who will provide inputs as and when required. Students are divided into 7 groups of about 8-10 members each (from different Universities)
<b>Session IX - Concluding Session</b> Venue: - Auditorium	
13.30 - 14:00	<ul style="list-style-type: none"> <li>❖ Concluding remarks</li> <li>❖ Certificates Distribution</li> <li>❖ Vote of Thanks</li> </ul>
14:00 onwards	Lunch Break



**Academia  
Engagement on  
Urban Sanitation  
under SCBP**

The primary purpose of engaging with Academic Institutes on non-networked sanitation was to introduce FSSM as an important emerging component of urban sanitation. Universities and academic institutes are best suited to integrate a conceptual and practical understanding of urban sanitation and waste water management challenges within the urban planning, engineering, architecture, management and social sciences domains - to provide the human resources in terms of fresh graduates, re-training and skill upgradation of on the job professionals, to address the problems of sanitation in the coming decade.

The following activities have been carried out with academia under SCBP until now:

### December 2017 Round-table Academia Meet

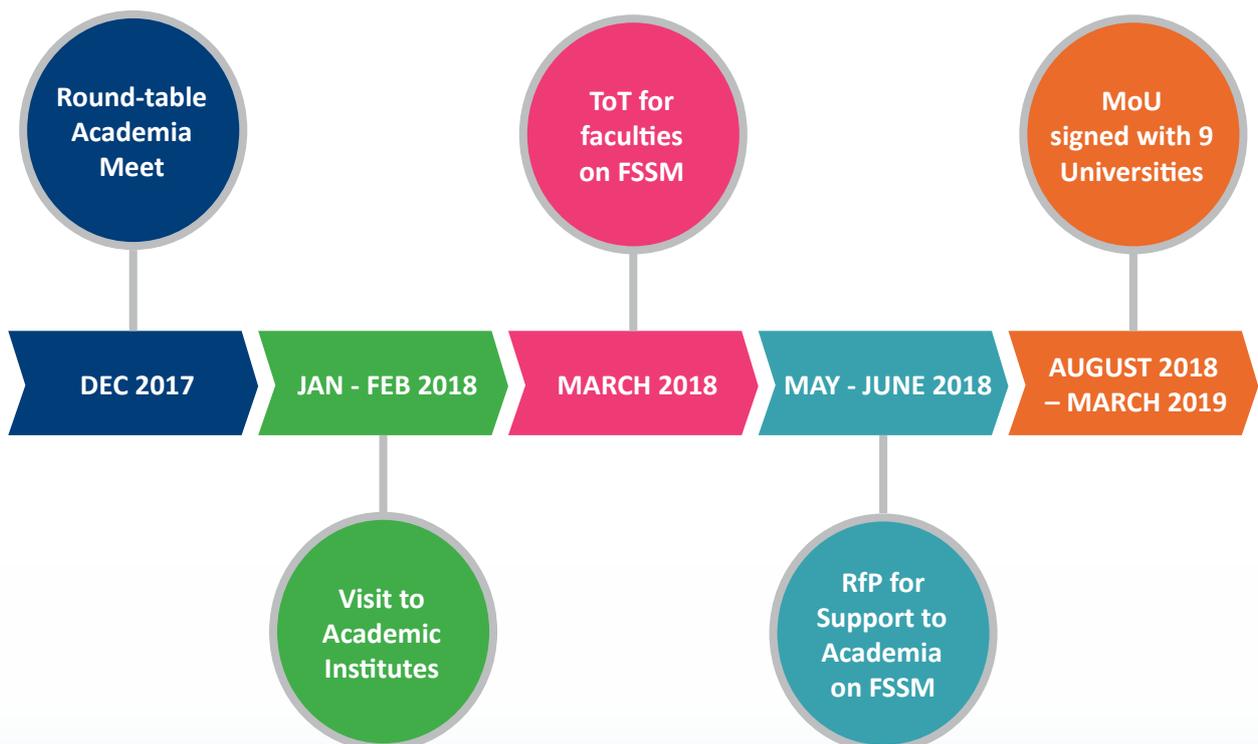
To further the agenda of capacity building on non-networked sanitation, NIUA organized a Round Table meeting with C-WAS, CEPT University inviting Faculties and senior professors from around 20 universities across India on 19th December 2017 in New Delhi to explore opportunities for collaborative engagement and support: integrating FSSM in course curriculum, research, certificate courses, electives, student internships, etc.



### Key takeaways and way forward

This Round Table meet was the first initiative to engage with, discuss and explore the need for further engagement with academia and the universities. Some of the key action points emerged:

1. **Undertake a ToT workshop** on FSSM for academic institutions – 1-2 day meet with a larger faculty of academic institutions to identify course curriculum integration potential
2. **Guidance for integration of FSSM** in Bachelors and Masters Courses – in all disciplines.
3. **Create a larger awareness of FSSM** – through lectures and workshops in academic institutions. Members of SCBP can be invited to take lectures or conduct workshops.
4. **Support for research projects on FSSM** for students and faculty.



5. **Create/facilitate a platform** or some other format :
  - a. Sharing existing learning material
  - b. Developing a research agenda for urban sanitation including FSSM
  - c. Forging collaborations and tie up with international universities, IHE and national academic institutions
  - d. Developing content for courses and case studies - addressing complimentary aspects of urban sanitation including technology, legal and policy, municipal systems, business models and financing, social and behaviour change, operations and maintenance, etc.
  - e. Follow up with students and other Trainees on effectiveness of training and improvement in pedagogy. Once decentralized sanitation is included in formal course work.
6. **Reaching out to central government academic systems** for FSSM course integration – NSS, UGC, AICTE, Swayam portal of MHRD. Address any accreditation challenges from NAAC and disruption through a certification process from govt.
7. **Generating demand from government systems for training of staff.**

*(Full report of Round Table Meet available on: <http://scbp.niua.org/content/decentralised-sanitation-round-table-meet-academia>)*

### January - February 2018 Visit to Academic Institutes

NIUA team with SCBP partners visited various universities to assess demand of such courses and understanding current curriculum requirements. Some of the universities visited were - MANIT Bhopal, SPA Bhopal, Indus University Ahmedabad, Xavier University Bhubaneswar, Shiv Nadar University Noida, BITS Pilani Goa.

### March 2018 Training of Trainers (ToT) for faculties on Non-Networked Sanitation



Training of Trainers (ToT) Workshop was organized for faculties from 17 renowned universities across India under SCBP with support of C-WAS, CEPT

University at Ahmedabad on 6th-7th March 2018. In the two-day workshop, participants discussed key aspects of non-networked sanitation and designed a course outline on FSSM for their institute.

### Key Highlights

- ❖ The workshop informed participants about the need of non-networked sanitation in the present context of sanitation situation in the country and discussed issues related to each component of the service chain.
- ❖ In a short span of the workshop duration, the participants managed to develop a course outline on non-networked sanitation. In the discussion, they enumerated the challenges and opportunities in introducing this course in their respective institutions.
- ❖ The training proved to be catalyst for the participants, enabling them to network over a topic that they had not discussed before and gain comprehensive understanding of non-networked sanitation.

*(Full report of ToT workshop available on: <http://scbp.niua.org/content/academia-engagement-fssm-workshop-march-2018>)*

### May - June 2018 Inviting proposals from Universities for support on Urban Sanitation Courses

A Request for Proposal (RfP) was floated on NIUA website inviting proposals from Academic Institutes and Universities to apply to NIUA for support on the following activities:

- ❖ **Design/implementation of curriculum and courses**
  - ❖ Elective/core paper on onsite sanitation systems for integration into existing programmes
  - ❖ Certificate short course for working professionals
  - ❖ Summer School or any other activity for students
  - ❖ Workshops/Learning events
- ❖ **Conducting field visits and studio exercises on aspects related to Decentralised Sanitation Systems** (assessments and planning, design of systems, organisational and legislative framework, financing, IEC and BCC, community engagement strategy etc)
- ❖ **Support to student for dissertation at bachelors/masters level** for conducting research studies on urban sanitation issues with focus on site sanitation systems.

Out of the proposals received for the above-mentioned activities, MoU were signed with 9 shortlisted universities based on the proposed activities for integrating non-networked

sanitation in multiple disciplines of engineering, architecture, urban planning, humanities and management.

### July 2018 – Mar 2019 List of Activities by Universities under SCBP engagement

**Under the ongoing SCBP-Academia engagement, until March 2019, the target is to reach out to more than 800+ University students and young professionals; 100+ government officials and train more than 40 faculties through Faculty Development Programs and Certificate courses across India on non-networked sanitation.**

❖ Additionally, persistent engagement and knowledge sharing with academia on non-networked sanitation is an integral part of SCBP strategy. More than 15 universities were invited for panel discussion to share their perspectives during the South-Asian Workshop on ‘Decentralised Sanitation Solutions’ in Mumbai on 18 Nov 2018.

- ❖ Similarly, few faculties from SCBP partner universities were invited for a mixed group Training of Trainers (ToT) workshop with EAWAG, Switzerland from 9-11 Jan 2019 at Delhi on how to efficiently conduct training programs and e-courses at university level.
- ❖ A faculty meeting of SCBP partner universities and sector experts was held on 8 March 2019 at Ahmedabad to share their feedback and outcomes of the SCBP engagement.

Overall, the following types of courses and integration of urban sanitation emerged through the SCBP engagement:

- ❖ Certificate Courses
- ❖ Studio Programs
- ❖ Electives/University-wide electives
- ❖ Workshops/Learning events
- ❖ Integration in existing course curriculum
- ❖ Summer-Winter Schools
- ❖ Faculty Development Programs
- ❖ Research Thesis/Capstone Projects

### University-wise List of Activities under SCBP engagement on Urban Sanitation

Sr. No.	Name of Institute	Activity	Target audience	Timeline	Identified Participants
1	Shiv Nadar University, Noida	Two-day Workshop and Half-day Policy Dialogue Meet: Water-waste cognition	Professionals in urban planning, citizen groups, municipal corporations	Nov 2018, Jan 2019	50 students + 10 govt officials + 20 practitioners
		University Wide Elective on Non-networked Urban Sanitation Systems	University Wide Elective for undergraduate students	Sep 2018, Nov 2018	30 students
		Field Visits and Studio Exercises on aspects of Non-networked Sanitation Systems	MSc, MA and undergraduate students of civil, architecture, design, sociology, etc.	Oct-Mar 2018	50 students + 20 practitioners
2	Guru Nanak Dev University (GNDU), Amritsar	Workshop and Studio Exercises for M.Plan students	M.Plan (Infrastructure)	Oct 2018	60 students
		Student Dissertations on Non-networked Sanitation Systems	B.Plan, M.Plan, M.Plan (Infrastructure)	Jan-Mar 2019	5-10 students
		State level Dissemination and Advocacy Workshop	City Officials, state officials, experts and practitioners	Jan 2019	60 students + 15 govt officials + 30 practitioners

Sr. No.	Name of Institute	Activity	Target audience	Timeline	Identified Participants
3	Maulana Azad National Institute of Technology (MANIT), Bhopal	Design and roll out of Short-Term Training Programme on Recent Trends in Urban Sanitation Systems	40 (20 professionals, 20 students)	Dec 2018	20 students + 20 young professionals
		One Day State Level Dissemination and Advocacy Workshop to promote Non-networked Sanitation	City Officials, state officials, experts and practitioners	Jan 2019	40 students + 25 govt officials + 15 practitioners
4	Institute of Design, Environment and Architecture, INDUS University, Ahmedabad	Introductory Two-Day Workshop on Non-networked Urban Sanitation	Local architects, NGOs, academicians	Oct 2018	80 students + 10 academicians + 10 practitioners + 2 NGOs
		Prototype of toilet-containment and treatment systems (A permanent exhibition)	20-25 B.Arch students	Dec 2018	20-25 students
		Curriculum development of Technical Module and course on FSSM and urban sanitation systems	For B.Arch Semester 4,6,8	Dec 2018	30 students per semester
5	Xavier Centre for Urban Management and Governance, XAVIER University, Bhubaneswar	Stakeholder Consultation and Curriculum Development for Certificate Course on Faecal Sludge and Septage Management	Working professionals, City Officials, state officials and practitioners	Sep-Dec 2018	8-10 practitioners
		Roll out of Certificate Course for upto 30 participants		Jan-Feb 2019	30 ULB/State officials and working professionals
6	Birla Institute of Technology and Sciences (BITS) Pilani, Goa Campus	Curriculum development and running of minor programme in water, sanitation and solid waste management for first degree students (for two electives Sanitation Entrepreneurship and Resource oriented Sanitation)	2 batches of graduate students, working professionals	Sep-Dec 2018	15-20 students per semester
		Prototype development/testing of innovations for FSSM	5 PhD/Post graduate students	Dec 2018	5 PhD/PG students

Sr. No.	Name of Institute	Activity	Target audience	Timeline	Identified Participants
7	Civil Engineering Department, College of Engineering, Pune (CoEP)	Curriculum development and running of elective course on 'Non-networked Liquid Waste Management'	U.G., P.G. Students of Civil Engineering and Town Planning	Sep-Dec 2018	30 students per semester
		Winter School on 'Non-networked Liquid Waste Management'	25 students nominated by Govt Colleges of Engineering Institutes in Maharashtra	Dec 2018	25 students and young professionals
		Faculty Development Program on 'Non-networked Liquid Waste Management'	24 teachers/ participants from 12 educational institutes/ Govt Colleges of Engineering Institutes in Maharashtra	Mar 2019	24 faculties
8	Lovely Professional University (LPU), Punjab	Workshop on Community-based technologies for domestic wastewater treatment and reuse	Planning Students, City Officials, state officials, experts and practitioners	Oct 2018	50 students + 10 practitioners + 2 govt officials
		Certificate short course on Planning and Design for Efficient Sanitation System	Working professionals, City Officials, state officials	Nov 2018	25 professionals and ULB/State officials
		Elective/Core paper on onsite sanitation systems for integration into existing programmes	B.Plan, M.Plan Students	Sep-Dec 2018	40 students per semester
9	Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur	Two Weeks Certificate Course on Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions	Working professionals, City Officials, State officials	Nov-Dec 2018	30 students and working professionals

# Annexures

# Annexure 1: Architecture

## Department of Architecture and Planning, Maulana Azad National Institute of Technology (MANIT), Bhopal

### Certificate Course

Department of Architecture and Planning, Maulana Azad National Institute of Technology (MANIT), Bhopal designed a certificate course on 'Short Term Training Program on Recent Trends in Urban Sanitation Systems'. The certificate course was rolled-out on 17-21 Dec 2018 at Bhopal for more than 50 students and professionals from Architecture, Civil Engineering, Environmental Engineering and Urban Planning background.

The certificate course had sessions on introduction to sanitation, urbanization and sanitation, sustainable sanitation and water management, sewage treatment, planning, technology and financing for FSSM, along with site visits to liquid waste treatment in Bhopal. A short pre-quiz before the course and a mini-test on completion of the course was conducted for assessment of the participants.

### State-level Workshop

MANIT Bhopal with support from NIUA also organized a half-day state-level workshop bringing together State Government and ULB officials, Engineers from parastatal department, practitioners, students and faculties to discuss perspectives and approaches on decentralized sanitation systems and technologies in India. State Officials and senior experts from the States of Odisha, Andhra Pradesh, Maharashtra and Tamil Nadu were invited to present their state scenarios and roadmap for ODF+/ODF++.

The Urban Development and Housing Department of Madhya Pradesh has also planned to construct pilot FSTPs and scale-up similar interventions with well-defined strategy. Capacity building of ULB staff especially Engineers on FSSM and operations of FSTPs will be critical to sustain the momentum.



## Institute of Design, Environment and Architecture, INDUS University, Ahmedabad

After conducting two day sensitisation workshop in September 2018 on ‘Sustainable Sanitation Systems: Role of Architects and Urban Designers’, Indus University developed a course outline to integrate water and sanitation aspects in its existing course curriculum, as suggest below:

# WATER AND SANITATION



This toolkit has been designed to introduced Water And Sanitation for students ofrom various disciplines pursuing their graduation. The kit and its implications in an architectural school has been studied in this particular scenario. The kit with its easy module system can be plugged in for a holistic unders tanding of various allied systems.

# Option 01

The toolkit could be introduced as a part of the technical module from Semesters 5 onwards, each semester dealing with the corresponding studio project and the studies complementing the design process.

- Semester 5 – Module 1
- Semester 6 – Module 2
- Semester 8 – Module 3
- Semester 9 – Module 4

# Option 02

The toolkit could also be introduced as a plug-in into the architectural course as a 3 day workshop with 4 tutor hours each.



Each Module is further divided based on the nature of work as Technical, Analytical and Collaborative Skill Development.



*The limited hours of the programme shall in the shortest of time span facilitate an understanding of Sanitation systems such that the architectural education shall be a holistic process.*



Knowledge Imparting hours in the form of Expert Lectures and Talks and discussions

**Tutor Hours**



Hours allocated for activities such as site visits and research

**Research Hours**

### Objective

To introduce the students to the various elements elemental for human survival in the 21st century, Air, Water, Food, Energy, Waste Management. This shall pave way for students to understand Sanitation and its implications in architecture

### Contents

- The various allied elements, Air Water, Food, Energy and Waste Management
- Need and benefits of safe sanitation.
- Introduction of Sanitation terminology, concept and context
- Issues and Impacts of Sanitation on Environment and Public health
- Current situation of Sanitation at National, State and Regional level Rural & Urban areas.

### Activities

- Case study of Sanitation in local precincts
- Mapping real case activities based on the case study
- Identifying real issues
- Studying factors behind the problem



6 Hours



6 Hours

## Module 1

### Semester Outline

The semester design involves the spatial study of an individual residence and its design. The sanitation study shall enable the students to relate the details in the house and sanitation needs and its impact at various scales, micro and macro.

### Objective

To attain a better understanding of Drainage systems, Waste Management Systems and Water supply.

### Contents

- Drainage system Processes at Urban
- Water Supply in Urban Context
- Waste Management System
- Design Solutions for the system.

### Activities

- Group case study of Rural and Urban area (National/ International and one Local)
- Evaluation of system: efficient/ inefficient and quick design solution
- Analysis of the Waste Management in a particular case study at Urban Context



6 Hours



6 Hours

## Module 2

### Semester Outline

The major studio in the semester emphasises on the value of details and developing the details through a rigorous process. The drainage and water supply study shall supplement this rigour of the studios.

### Objective

To attain a better understanding of Policies and Finance Programmes for an overview of sanitation framework.

### Contents

- Various Government policies and campaigns
  - Standards, materials, construction & budget
  - Pros and cons of the policies – Refer various journals
- Finance
  - Government subsidy
  - Micro financing and Revolving funds
- Social aspects
  - Stakeholder identification
  - Community participation –awareness programs

### Activities

- Case study of Sanitation in local precincts
- Mapping real case activities based on the case study
- Identifying real issues
- Studying factors behind the problem



8 Hours



4 Hours

### Semester Outline

The semester design involves with an urban insert programme. The policy framework and an understanding of the finance programmes shall thereby facilitate a better understanding of design insert.

## Module 3

### Objective

To be able to partake in the design process with a technical understanding of the system

### Contents

- Various technologies and treatment implementation of Sanitation.
- Design considerations of technologies– climate, topography, economy & needs of local.
- Government approved norms and standards of systems
- Cost estimation of system – Considering Local availability.
- Operation & Maintenance

### Activities

- The existing design problem could be produced with a layer of Sanitation thereby understanding the practical concerns of the design.



4 Hours



8 Hours

### Semester Outline

The studio involves the students to formulate their own design programme. Hence a technical understanding of the sanitation system shall facilitate the design incorporated with the sanitation system.

## Module 4

**Indus University carried out an exercise for 4<sup>th</sup> year Architecture students to explore various allied elements of Urban Sanitation namely: Air, Food, Energy, Water and Waste.**

Excerpts from the exercise is given below:

**Water**

Water is our most precious resource, supporting all life on Earth. It is a transparent, colorless and odorless chemical substance which is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. It is vital for all known forms of life. Through this process, we have been trying to develop a deeper understanding on the process chains of water from its source to its usage.

The main categorization is based on the source, supply and usage of water. The study helped us to know what are the available water sources on Earth and how does it get distributed proportionately for irrigation, industries and household usage. Also we came across the processes for clarification of water that are done before the water reaches the house and also studied the sewage water management systems.

Rain water harvesting and its methods were also studied to help the constantly undergoing ground water level and trying to save the national resource for the future.



**Waste**

Waste is anything which is not useable in its original state, commonly known as trash. We deal with n numbers of waste in our entire day. It can be from a broken pencil to an unused car, can be categorized under waste.

Waste has typically two main segregations:

- ❖ **Solid Waste** –These include all the items commonly seen in a trash can.
- ❖ **Liquid Waste** – These include wastewater, gases, or sludge's and hazardous household liquids.

Ahmedabad belongs to one of the cities which produce high amounts of waste. The management is done by the local municipal body (AMC). Ahmedabad Municipal Corporation has divided the system into 'solid waste' and 'liquid waste' management systems. We spilt into groups which looked into these two categories in detail. This was to get a closer idea of the waste management strategies followed by the city on an urban level. To cover 464 km square area, the municipal body has divided the city in to six zones. We studied the new west zone, the journey from trash can to decomposition. There are two trash cans provided by the AMC to each community to societies. Green for wet waste and Blue for dry waste. There is a truck which goes around collecting these trash cans having two separate chambers where 70% is occupied by wet waste and 30% dry waste. Every zone has local segregation plant then it is transferred to the main dumpsite 'Pirana'. The problem with Pirana is there are all kinds of trash dumped together which is making it toxic and turned the area into brownfields.



# Annexure 2: Urban Planning

## Guru Ramdas School of Planning (GRDSP), Guru Nanak Dev University (GNDU), Amritsar

**A Studio on Urban Infrastructure Planning with a focus on Urban Wastewater management was conducted for Raja Sansi town in Punjab. The executive summary of the studio is given below:**

### **Executive Summary**

In most of the highly developed countries, 80% of sewage and wastewater is released to the environment without any treatment, which have influence on human health, quality of life, standard of living of the people residing over there, economic productivity, quality of freshwater resources and it degrades aquatic ecosystem also. This problem mainly arises due to lack of physical infrastructure like the sewerage or the on-site sanitation system which leads to the above problems. In a developing country like India, the problems related to wastewater management and reuse arises due to the various factors like lack of treatment, lack of infrastructure and lack of capital investment. The 2011 Census of India has indicated that nearly 17 million urban households lack access to adequate sanitation. Main focus is on the 1st and 2nd class town, however, the other towns are deprived of sanitation facilities. So in this context, the topic Faecal Sludge and Septage Management is chosen which deals with the on-site sanitation facilities and provides proper facilities in the non-skewed areas.

Faecal Sludge and Septage Management is a decentralized sludge and septage management process which includes mainly five components and together form a faecal sludge value chain. Faecal sludge and septage management is the only affordable and sustainable technique as compared to centralized sewerage system and can also be implemented quickly to make cities clean and healthy. FSM is a very important approach providing the improved sanitation.

The town which has been selected for the research is Raja Sansi which is a Nagar Panchayat in district of Amritsar, Punjab. It is a class IV town in the sub district Ajnala. It lies on the main arterial road known as Ajnala Road. It is least populous nagar panchayat of Ajnala sub district. The geographical area of the town is 4 km<sup>2</sup>. Raja Sansi town is divided into 13 municipal wards. The town has a total population of 14,298 and 2898 households with an average of 5 persons in each family.

The sanitation situation in the town is very bad. According to the Census of India 2011, in the town only 58.83% of the households have toilets which are mostly connected to septic tanks i.e 35.19% and 64.80% have pit latrines. Raja Sansi does not have any City Sanitation Plan (CSP) for their municipality. Town has already started the work for the preparation of Detailed Project Report for the sewerage network in the town.

However, this project report have been prepared five years ago but it is not yet implemented due to the various restrictions by the Airport Authority. The geographical slope of the town is towards the runway of the Guru Ramdas International Airport and they do not gives the permission of the sewage being collected over there.

In the town Raja Sansi 86% of the total households having toilets within their premises and 14% of the households do not have any household toilets because of lack of lands availability, funds and land tenure issues. Remaining 14% of population is using community/public toilets or they are practicing open defecation, which creates the smell in the environment. Out of 14%, 65% of the households are still practicing open defecation in the town, however, the town has already been declared as open defecation free, but still households having no toilets practice open defecation, especially

in ward 8, 10 which are near pond. Around that area the quality of drinking water is very poor and even that water is not suitable for drinking.

These wards are the most critical wards in terms of open defecation. Ward no. 3,4,5,6 have 100% household toilets because these wards are newly constructed and don't have any septage related problems. Ward 1,2,7,8,9,10,11,12,13 are old wards and almost 20% of population don't have toilets facilities. Nagar Panchayat is providing very less funds for the construction of household toilets i.e only rupees 6000 due to which many household toilets are poorly constructed.

In the town Raja Sansi, the sewage generated from the houses is collected in the septic tanks. The septic tanks are with and without soak pits. Out of the total households only 72 percent of the households have the septic tanks and the rest 28 percent dispose of the sewage from the houses directly to open drains. Such a situation in the town creates many issue related to health, environment and it also affects the aesthetics of the town. In 28% of households, 90% of the toilets are directly connected to open drain and others have pit latrines. Such poor conditions in the town are the major reason for the unhygienic conditions in the town.

Large proportion of the population is dependent on septic the tanks but still they are not properly maintained by the households. Desludging frequency is observed to be invariably low (once every 8-10 years). Desludging is primarily done by the private operators. The town is served by one or more private operators. For the desludging of septic tanks in the town the Raja Sansi, the Nagar Panchayat has signed a contract with the private operator of time period 6 months, which has now been terminated. Most of these trucks have a faecal sludge storage capacity of around 3500 L to 4500 L. However, the inaccessible areas of all these towns continue to depend on non-mechanical desludging. The desludging user charges also vary greatly from mechanical to non-mechanical. Main mode of desludging is non mechanical i.e. 69% of the desludging is done manually which is against the law of Manual Scavenging Act, 1993. The reasons for illegal

manual scavenging is the easy availability of labour form ward no- 8, 10, 12 and 13. However, private trucks for cleaning septic tanks are coming from a distance of 10 km and they are sometimes even not available. Therefore, people prefer to get cleaned their septic tanks manually by easily available labour in town.

There is very little awareness on the need for treatment of faecal sludge amongst all the stakeholders interviewed in the process of data collection in the town. Neither was wastewater treated in the town.

Desludging which is done either manually and mechanically by sanitary workers, dispose the septage along the roads, drains, open land and the ponds. The main disposal system of Raja Sansi is in the municipal drain. 78% of households those who have a septic tank and those who haven't generally dispose the septage and the septic tank outlet to the open drains. The drains are along with both side of the roads in most of the wards and connected to the municipal drain which runs under the runway of Amritsar airport which is in very poor condition. In ward no. 1, 8, 9, 10, 11 and 12 are the most critical wards (refer map-4.4) in terms of disposal because, 95% of the households are not having septic tank therefore, the septage approximately 119.37 KLD is disposed to the open drain. The drinking water condition along these wards is very poor. The characteristics of the sample analyzed, show that the total dissolved solid is more than 500 mg/L but less than maximum permissible limit i.e. 2000mg/L. The two samples are not potable as evident by suspended solids, sample will fail Turbidity test.

Than after analyzing the existing situation, proposals are given as per the increased requirement over the next ten years. Assessment of the financial status of the Raja Sansi Nagar Panchayat has been done. The proposals are given as per the process of the sanitation value chain. As there was no existing treatment facility in the town, so now DEWATS have been proposed which is a decentralized treatment system and from the treated sludge, the manures are produced which will enhance the quality of soil when used for the agricultural purposes.

## List of Thesis Topics on Urban Sanitation (2018-19)

S.No.	Class	Topic	Supervisor
1	Master in Planning (Infrastructure)	Fecal Sludge and Septage Management plan for Majitha Town, Amritsar	Ms. Sakshi Sahini
2	Master in Planning (Infrastructure)	Fecal Sludge and Septage Management, Itanagar City	Ms. Ritu Raj Kaur
3	Master in Planning (Infrastructure)	Preparation of City Sanitation Plan: Fatehgarh Sahib	Dr. Kiran Sandhu
4	Master in Planning (Infrastructure)	Urban Sanitation Benchmarking of Dharamshala City	Ms. Ritu Raj Kaur
5	M.Tech.(Urban Planning)	Decentralized Fecal Sludge and Septage Management, Shri Muktsar Sahib	Dr.Ashwani Luthra
6	M.Tech.(Urban Planning)	Decentralize Waste water Management in Phagwara	Dr.Ashwani Luthra
7	M.Tech.(Urban Planning)	Fecal Sludge and Septage Management in vicinity of Dal Lake, Srinagar	Ms. Sakshi Sahini
8	M.Tech.(Urban Planning)	Decentralized Sanitation Planning Strategies forAjnala, Amritsar	Ms. Sakshi Sahini
9	M.Tech.(Urban Planning)	Waste Water Management system in Adampur Town,Distt.Jalandhar	Dr. Kiran Sandhu
10	M.Tech.(Urban Planning)	Planning for Ecological Sanitation in Moga Town	Dr. Kiran Sandhu

## About Master of Urban Infrastructure Program

Two year Masters program offers courses and studios on preparing infrastructure plans at city level and infrastructure project development. Studios also explore interdependence between urban development and regional infrastructure facilities like Airports, Ports, SEZ etc. The students are trained to engage with scales from local project to city, region and global through studio courses, theory courses, hands-on tutorials, individual capstone project and technical guided field visits in India and abroad during summer and winter schools.

## About the Urban Infrastructure Project Studio (WaterSan)

Infrastructure project studio in the third semester of the Infrastructure Planning Program focuses on Water-Sanitation system. Development activities for different infrastructure sectors whether in public or private domain, involve plan preparation, project formulation and implementation. Often the absence of a comprehensive city wide plan and an inadequate understanding /attention to inter-Sectoral issues in water and sanitation, results in poor project formulation. It is possible to improve on this by developing a comprehensive city/region water and sanitation plan approach at city level. This accompanied by appropriate technical and financial analysis leads to selection of appropriate projects. This studio exercise aims to equip students of this wider understanding of plan formulation process and tools and techniques of project identification for service performance improvements. Within urban infrastructure, it focused on water supply and sanitation. It aims to develop amongst students, an understanding of basic concepts of institutional, technical, financial and stakeholder analysis for city wide water and sanitation service delivery while exploring emerging approaches such as climate resilient cities, WSUD and IUWM.

## Faculty

Over last more than 10 years this studio had been guided by Dr. Meera Mehta and Dr. Mona Iyer and has covered about 15 cities in India. In 2018 the studio was guided by Dr. Meera Mehta and Dr. Mona Iyer and Prof. Ashwani Kumar with Academic support provided by Abhilaasha N. The group comprised of 32 students of Infrastructure

Batch 2017-19. The Studio received continuous inputs from Dr. Dinesh Mehta and C-WAS team.

## Course Structure

The studio exercise involves preparation of city water and sanitation plan for a chosen city. Specific sub-sectors include water supply, sewerage (both sewered and non-sewered options), storm water drains and solid waste management. The city water and sanitation plan includes broad technical, financial, institutional, policy and program related aspects. It covers the entire service chain from capture at household/ community levels, conveyance/ transport, treatment, disposal and reuse through centralized and decentralized systems for each of the above mentioned services. The guiding principles for this academic exercise include: spatial equity, access for the poor, sustainability (financial, institutional, environmental and technical) and integrated service delivery. Infrastructure Project studio assesses the infrastructure status in the city and across zones assesses gaps in service delivery and suggests strategies to overcome this gap.

## Objectives

The objectives of the studio are:

1. To assess city level WSS service performance, to identify key spatial, technical, financial and institutional issues in service delivery.
2. To identify options and actions for performance improvement, calibrate different actions in terms of costs, phasing and performance impacts.
3. To develop a comprehensive understanding of new approaches like WSUD, IUWM, resilient cities, localizing the SDGs, etc. to city level water and sanitation services.
4. To understanding the wider aim of plan formulation process and tools and techniques of project identification for service performance improvements.

The students are divided into four groups, which encompass city wide and sector level themes. The groups include water and city wide institutions, Sanitation and city wide implementation, Storm water management and city wide finances, solid waste management and city wide monitoring.

## Timeline of the studio

The studio is generally divided into four stages:

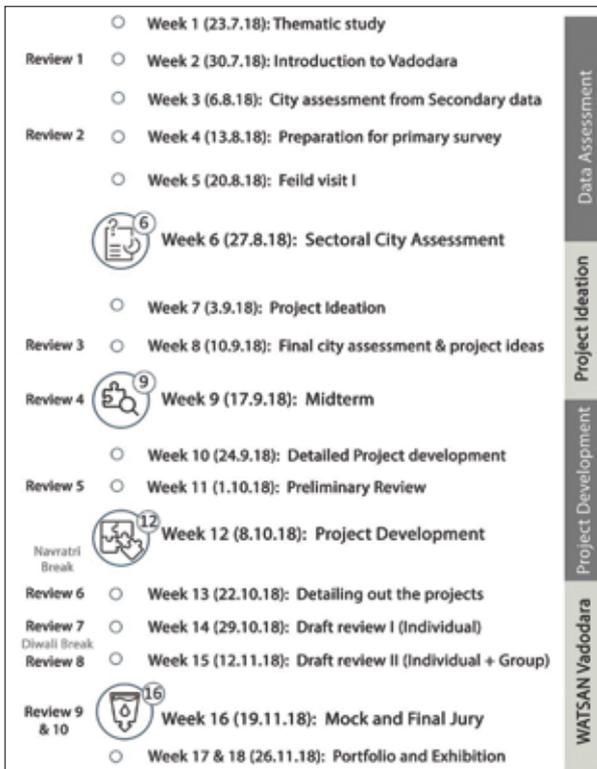
1. **Data assessment:** The students collect preliminary data about the selected city

through primary and secondary methods to build a scenario about the current infrastructure services in the city.

2. **Project Ideation:** In this stage, students analyse the data and also review best practices nationally and internationally, leading to formulation of vision for the sectors and individual projects emerging from the same.
3. **Project Development:** Based on field visits, discussion with varied stakeholders in the city, students developed their projects, with costing and phasing.
4. **WATSAN interventions:** The interventions are amalgamated with the Sectoral vision and connected to local and global discourses, to give comprehensive sector proposals. The amalgamated water, sanitation, storm water and solid waste sector work is then grouped as a comprehensive WATSAN plan for the city.

The chosen city for Monsoon Semester 2018 was Vadodara, Gujarat.

The timeline is seen in Figure 1.



## Water and Sanitation in Vadodara: Monsoon 2018, Semester (III)

This summary of the studio exercise introduces the city briefly and then delves into its infrastructure sectors. With respect to Vadodara, storm water has been seen from resource perspective while water supply, human waste,

grey water drainage and solid waste (MSW, E-Waste and Bio-medical waste) has been seen from service delivery perspective. The scenario, issues and interventions were developed in detail and are explained in brief in following sections.

Vadodara is located in the south eastern part of Gujarat state, along the golden corridor. With an area of about 300 Sq. Km, it is third largest city in the state. According to Census 2011, the Vadodara Municipal Corporation (VMC) area population is about 16 lakhs, while the VMC and Outgrowth area is about 17.5 lakhs. The sex ratio is 921. The slum population is about 5 per cent of the total population. VMC has a staff capacity of 8000 out of which 7029 are recruited. VUDA has a staff capacity of 170 and has 17 staff members recruited. The VMC and VUDA work for the comprehensive and planned development along with gram panchayats. Engineering department's water works project department is the implementing agency for water distribution. Storm water department provides the drainage network. The sewerage department works on the related installations, O&M and monitoring of all STPs. The health Department handles the SWM in the city and works on collection, transportation and disposal of waste. The PHE works on monitoring water quality and treatment including analysis and assessment of health reports. The accounts department works on cost recovery and collection of water charges. The IT department works on the complaint redressal system. Apart from these, there are academic institutions like MS University, Nonprofit organisations like Vahoo Vishwamitri, United way of Baroda and INTACH actively working in the city. The total budget of Vadodara is 4821.53 INR crore. The per capita revenue income is INR 4653 for FY: 16-17 which is higher compared to other cities of Gujarat. The major source for revenue income for ULB is tax revenue such as water tax, sewage tax, cleanliness tax etc. and non-tax revenues; Sources of capital income is grants, water development fund, selling of lands etc. Major components of capital expenditure are water supply works, storm water gutters, etc. and revenue expenditure includes maintenance, salaries, interest payment, contingency etc. Tax collection efficiency for 2016-17 is 98 per cent for current tax collections and 43 per cent is arrears collection. Property tax consist of general tax, Water tax, Conservancy and sewage tax, Cleanliness tax, Education cess and fire tax, which is approximately INR 3500 annually.

## Sector Profiles

### Storm water sector

The main feature of Vadodara's natural system is river Vishwamitri. It originates in the hills of

Pavagadh and slopes down to the Gulf of cambay joining Dhadar. The city depends on two major water resources, Ajwa-Pratapura reservoir and the French wells in Mahi at Fajalpur. The city experiences rainfall from June-September with major floods reported in 2005 and 2014. The entire city slopes down from the Pavagadh hills (NE) to the Gulf (SW) with an average slope of 5 per cent. There is 242 km of natural drain/Kaans network within VMC, with 5 major Kaans. 21 Sq. km of area are under lakes and reservoirs. In VUDA (Vadodara Urban Development Authority) and VMC area, there is mostly clayey moist soil that allows slow infiltration. There are totally 4 storm water zones in the VMC area. The SLB indicators (2017-2018) (C-WAS, 2018) show that the coverage of storm water drainage network is 28 percent and incidence of water logging/ flooding is 7 per cent. Though storm water is not restricted to the administrative boundary and there is no special authority to manage the same, there have been various schemes which have addressed themes under storm water management. These include: 1. Rejuvenation of Kaans and providing storm water drains under JnNURM. 2. Storm water master plan, Vishwamitri River resectioning and rejuvenation works and provisioning of storm water lines under JnNURM taken up by the VMC. 3. Provision of storm water drains by AMRUT. 4. Rain water harvesting, redevelopment of Sursagar Lake, deep water recharging by SCM.

### Water Sector

This sector in Vadodara is seen from the water supply perspective. Vadodara has a supply of 505 MLD with 162 LPCS. The main sources are Mahi (295 MLD), Ajwa (145 MLD) and Narmada (65 MLD). There are three WTPs, Dodka, Khanpur and Nimeta and 4 water zones. The SLB indicators of 2017-2018 (C-WAS, 2018), state that the coverage of water supply connections is 90 per cent and the extent of Non-revenue water is 30 per cent. The continuity of water supply is 1 hour per day and the cost recovery in water supply is 78 per cent. It also states that the efficiency of complaint redressal is 80 per cent and the efficiency in the collection of charges is 89 per cent. The extent of metering is 4 per cent and the quality of water supplied is 98 per cent. There have been projects under various programs and missions to look at the water supply sector, which include 1. Network metering, Source up gradation, Elevated storage reservoirs (ESRs), Ground storage 2. reservoirs (GSRs) and feeder network up gradation under JnNURM. 3. Water supply source augmentation and rejuvenation of water bodies under AMRUT. 4. 24\*7 water supply, smart metering, SCADA, water ATMs and rainwater harvesting under SCM.

### Sanitation Sector

In the VMC area, there are three sewerage zones, with 95 per cent network coverage. While the sewage generated is 374.8 MLD, the sewage collected is 358 MLD. There are 52 Auxiliary pumping stations (APS), 4 MPS and 7 Sewage treatment plants (STPs) in the city. 86 per cent of the sewage is treated which is approximately 86 per cent. The SLB indicators show that there is 100 per cent coverage of toilets. They also show that the collection efficiency of the network is 68 per cent and the adequacy of treatment capacity is 68 per cent as well. The quality of sewage treatment is 95 per cent, but the extent of reuse and recycling is just 1 per cent. The extent of cost recovery is 131 per cent and the efficiency in complaint redressal is 98 per cent. The efficiency in collection of sewage charges is 93 per cent (C-WAS, 2018).

There have been various projects under programs and missions which have led to improved service delivery which include: 1. Extension of sewer lines and up gradation of STPs under JnNURM. 2. Individual HH latrines built in Slums under NGSY. 3. Construction of Rajeev nagar STP and other APS, up gradation of STPs as per GPCB, Interceptor sewer lines at inlets in Vishwamitri River under AMRUT. 4. SCADA at 45 APS/MPS and 5 Eco Toilets under SCM.

### Solid Waste Sector

Divided into 4 zones, the VMC area generates about 1200 MT/Day. 1130 MT/day is transported daily through 225 routes. VMC has identified 1347 nuisance spots. There is one elevated transfer station (ETS), one integrated processing facility proposed and one bio-methanation plant. The landfill site is at Jambua. The SLB indicates that there is 100 percent coverage of SWM services and 98 per cent collection efficiency. Though the extent of MSW recovered is 100 percent, none of it is segregated. The scientific disposal of MSW and redressal of complaints is said to be 100 per cent. The extent of cost recovery of SWM services are 6.7 per cent and the efficiency in collection of MSW charges is 84.2 per cent. There have been projects under various programs and missions which include 1. Waste to energy, construction and demolition waste processing, plastic waste recycling facility, integrated processing facility and point of interest system by VMC. 2. Landfill development and related machinery, transfer stations, up gradation of Atladara facility, Capping and social upliftment, CND facility under SBM.

### Methodology and Proposals

The methodology focuses on deriving an assessment framework for each sector which

would provide the lenses required to understand and prioritize the needs of Vadodara for sector specific and intersectoral issues. The analysis included a perception study through the union of national and state programs and policies related to each sector, and secondary data review of the past and present-day situation in Vadodara, followed by delineation of the study area, shaping the geographical scope for intervention. City assessment involved reconnaissance survey and stakeholder consultations. Stakeholders from various institutions and user groups were identified and several semi-structured interviews were conducted in order to understand the city beyond numbers and reports. The convergence of scope, secondary and primary data analysis aided formation of the assessment framework for each sector which assisted in formation of an approach for the sector, leading to a vision, a set of objectives and areas of intervention. These are summarized for each sector in following sections

**Stormwater: (Members: Bhanu, Supriya, Swati, Souritra, Darshil, Mrunmayee, Tanya Gunjan, Kajal)**

Stormwater Management involves the both natural & man-made systems, along with the stakeholders forming the basic two lenses of assessment. Stakeholders are the governing bodies or people involved in management of all these systems, citizens effected directly or indirectly and the natural ecology. The performance of systems and stakeholders is effected by the human activities which contributes to their vulnerability. Thus forming the additional lense for analysis resulting into city’s resilience towards disasters caused by stormwater and city’s capacity to capture this rainwater and become resource sufficient. Overall, resilience against an occurrence of rainfall is low in Vadodara. Poor planning and

management are causing storm water to act as a bane. Thus, the vision was to achieve increased resilience in Vadodara: **“Rains for life | Envisioning a resilient Vadodara that can consider rain as means to sustain life and not damage it.”** The focus of interventions was

1. Developing mitigative measures & adopting a proactive approach to planning.
2. Focus on water-sensitive planning & design.
3. Integrated approach towards efficient resource management.
4. Efficiency in the institutional framework.

Storm water was not treated like a line service since it does not adhere to administrative boundaries. For efficient management, a wholesome solution commencing at the macro scale (watershed/catchment) level down to the micro scale (plot level) was envisioned. Eight such interventions were identified to manage rain water at different scales; ensuring an integrated approach. Each of them provides a solution to improve the systems’ and stakeholders’ performance through a combination of technical, institutional, regulatory, financial or capacity building/awareness propagation solutions; as required to address the issue being dealt with. These are depicted in Figure 1:

**Water: (Members: Shravani, Nivedita, Saubiya, Darshan, Veda, Shweta, Snoken, Zinkal)**

In order to understand the various components of the water sector and in the pursuit to develop a meaningful assessment of ‘What water means to Vadodara’, a framework was developed to establish the parameters through which the city could be evaluated. After an exploration of the various discourses around water over the years and a current emphasis on the global call for action on providing ‘clean water and sanitation for all’ under Sustainable Development Goal

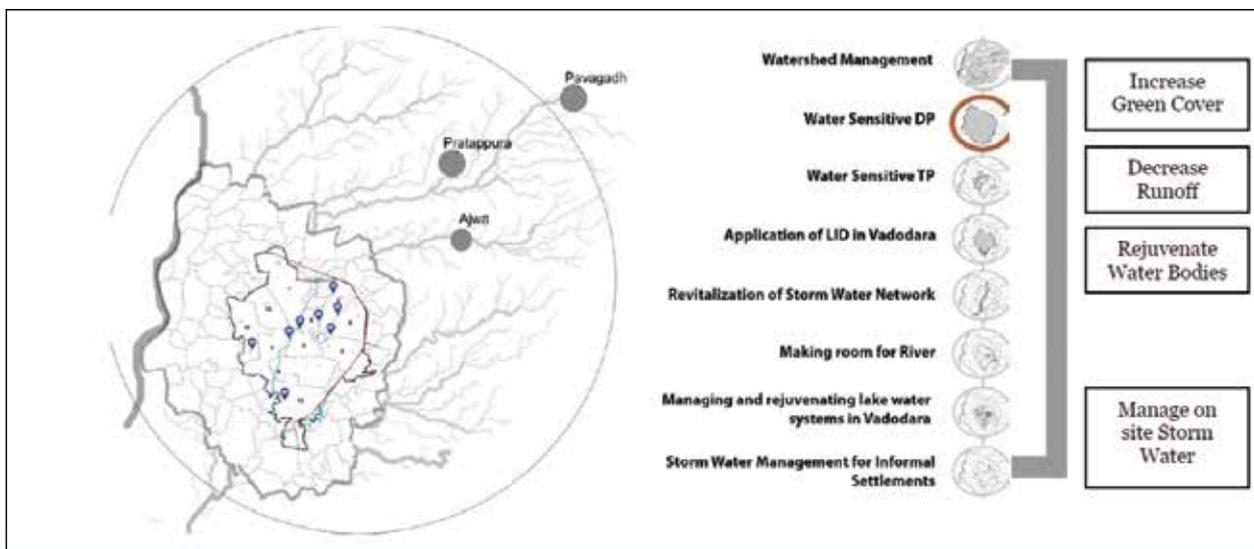
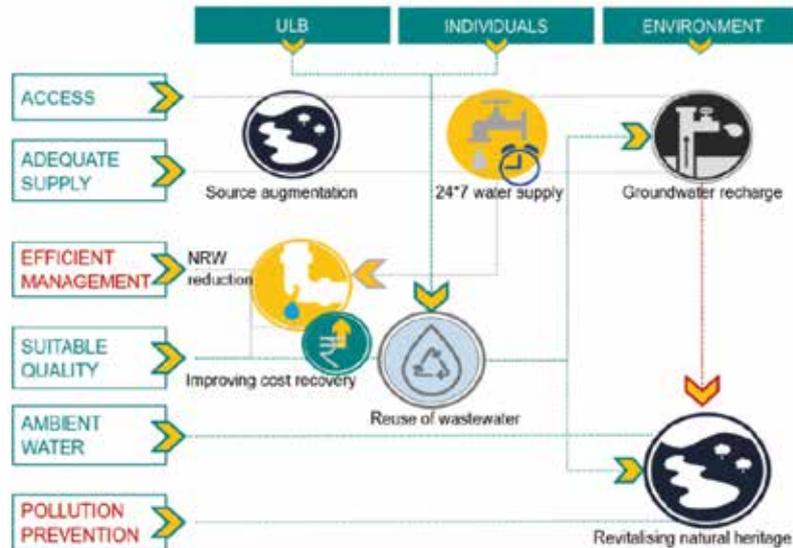


Figure 2



6 and the various targets it aims to achieve with respect to the water sector, a ‘Rights and Responsibilities’ based framework was developed. This framework assess various aspects of rights and responsibilities with respect to water, for an individual living in Vadodara and the Municipal Corporation and also examines the impact of the same on the environment. For example, based on the right to access of water, it would examine the access water for urban local body from its various sources and similarly it would do the same for an individual or a stakeholder in Vadodara. After an assessment of these aspects, based on secondary data and on ground assessment various issues were identified and solutions were proposed for the same. In order for Vadodara to align it self with the global SDG of ‘Clean water and sanitation for all’ and prioritize the targets of the same, the city must focus on water as a resource and the service of the supply chain. While aiming to align with the SDGs, it is also important to address key local issues as derived from the framework. However, only action by the VMC will be insufficient to tackle these issues and it is imperative that the responsibilities of the same are also shared. With these aspects in mind, the vision for water sector in Vadodara is To Manage Water Resources and Assure Efficient Provision of Water Supply Services by engaging the numerous stakeholders to achieve the following objectives:

1. Water Resource Management
2. Enabling reliable access of suitable quality of water
3. Efficient provisioning and consumption of the resource
4. Developing a framework for better water governance

In order to achieve this vision and meet these objectives various interventions from policy based solutions, to IEC campaigns, to institutional reforms, to project solutions were developed to address key issues. Some interventions could address more than one objective. These are depicted in Figure 2 are listed as follows They are

1. Source Augmentation – the case of Ajwa reservoir.
2. Enabling Efficient Network Management by –
  - a. Examining the feasibility of 24x7 water supply.
  - b. NRW Reduction
  - c. Cost Recovery in water supply services.
3. Resource management through Ground Water Recharge.
4. Revitalization of natural heritage structures.
5. Waste Water Reuse
6. Water Security Model for peri-urban areas.

**Sanitation: (Members: Shivani C, Ravichandra, Tania Pal, Shelly, Jash, Sreenidhi, Krupal, Ruth)**

The methodology focuses on deriving a framework for sanitation which would provide the lenses required to understand and prioritize the needs of Vadodara. The framework considered sanitation as a system, a combination of different functional units that together allows managing, reuse and disposal of waste. Therefore, it digs into the value chain of sanitation in order to explore areas of service delivery and resource potential. Hence, it has identified issues pertaining to individual unit of the chain. To assess the underlying issues, along with their cause and effect in each section of the sanitation value chain, a problem tree analysis was conducted. The analysis helped in identification of clear

and manageable goals and strategies, and how to achieve them. It also identified the social and environmental impacts caused due to the issues, and the target areas for intervention. The vision was 'Capturing the value chain, by enhancing sanitation systems and augmenting resource potential. 'The vision envisaged the trickle-down effect of how enhancing service systems would lead to resource capture, which would translate into economic returns, both financial and social. The objective of the study was to strengthen institutions and value chain, augment waste-water as an untapped resource and concur socio-economic benefits by improving public and environmental health. Under systems, the vision envisages improvement of efficiency and enhancing effectiveness, to serve the unserved and ensure access and safe disposal. As a resource, it focuses upon sanitation systems which recognise waste as a potential resource for reuse and explores governance systems for resource optimization. The vision viewed sanitation as an investment with high economic returns and socio-economic benefits across all sections of society.

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sanitation as an investment with high economic returns and socio-economic benefits across all sections of society. The broad areas of intervention that the study came up with in order to enhance Vadodara's service chain and resource potential are as follows and are depicted in Figure 3-

**USER INTERFACE:** Sustaining the 2016 status of Open defecation free Vadodara. **CONVEYANCE:** Augmenting complaint redressal mechanisms through application of SCADA and moving towards ODF++.

**TREATMENT:** Devise a framework for STP provisioning

**DISPOSAL:** Addressing sanitation system in peri-urban areas and septage management.

**REUSE:** Market analysis and financial models for wastewater reuse.

**Solid waste management:**

**(Members: Nida, Shivani K, Mrutunjay, Yash, Jinita, Drashti, Archa, Anupama)**

SWM of Vadodara was studied based on its value chain viz., generation, collection, storage, processing and disposal (see figure 1). To obtain a holistic view, the system was understood through three lenses. Firstly, the SWM of the city was assessed through website 1 which involved thorough reading of the secondary documents, mainly the content published by the VMC, which accounted for the supply-side data, and guidelines like SWM Rules 2016, CPHEEO Manual on SWM. Secondly there were extensive site

visits made to observe the present scenario of SWM on ground. This mainly consisted of field observations and analysis. Lastly, the demand-side data was obtained through numerous stakeholders' interviews and group discussions. The amalgamation of all this data led to a deeper understanding of the SWM of the city. The vision for managing solid waste was formulated

Figure 3

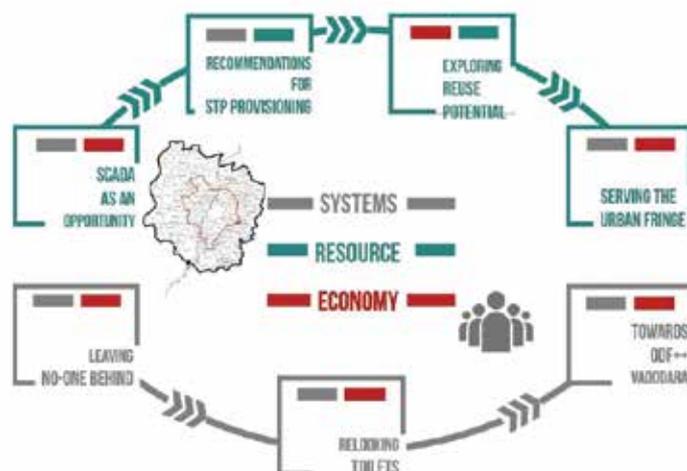
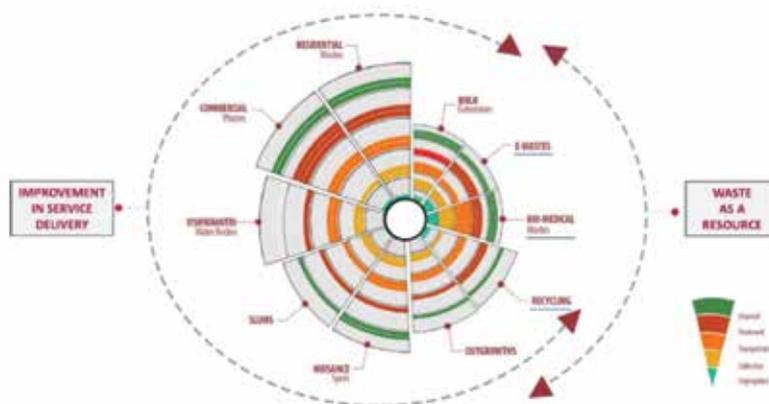


Figure 4



as —Developing a resource-efficient waste management plan for Vadodara||.

The first of the eight interventions planned deals with developing a model framework for source segregation by focusing on segregation and collection at nuisance spots, while the second one targets the streets to achieve a higher cleanliness quotient. Intervention three aims to develop an SWM plan for water bodies. The fourth intervention deals with a special waste and provides a framework for e-waste

collection and treatment. The following two interventions have a focus on waste to energy concept, capitalizing on the large amount of bio-degradable waste generated in the city and the bulk generators – with a special focus on hotels & restaurants. Intervention seven aims to achieve efficient waste transportation to the landfill and the final intervention propagates sustainable management of the current landfill, while exploring the possibilities of an alternative landfill location for the city. The concept is depicted in Figure 4.

**Synthesis:**

Under the four sectors, there were 32 interventions proposed in this academic exercise. They were phased and the overall costing was arrived at. This suggests the complexity in infrastructure provisioning for the ULB, and the need for immediate actions in most areas. The interventions proposed have also focused on connecting to the national agenda of SBM, in specific to the Swachh survekshan and ODF cities. The interventions also connected to the international agendas such as the sustainable development goals and 100 resilient cities. They addressed 3/13 targets in Goal 3 (good health and well-being), 6/8 targets in Goal 6 (clean water and sanitation), 8/10 targets in Goal 11 (sustainable cities and communities), 5/5 targets in goal 13 (climate action) and 8/12 targets in Goal 15 (life on land). Thus the interventions aimed to lead towards an efficient Vadodara, where the existing infrastructure systems would be strengthened with the visions of all the sectors, as indicated in Figure 5.

Figure 5



## Draft Course Outline: Faecal Sludge and Septage Management

*(For a One-Semester Course)  
Developed by C-WAS, CEPT University*

### Learning Goals and Objectives

Sanitation has been on the forefront of development agenda in India. The Government of India's Swachh Bharat Mission and AMRUT programme have focused on eradicating open defecation and providing proper sanitation infrastructure in the cities.

In India, only few a cities have 100 percent coverage of sewerage network. In most cities with sewer network, the coverage is partial. On the other hand, over 75% of cities depend fully on onsite sanitation systems. The national government also recognizes the role of onsite sanitation system in National Urban Sanitation Policy and Septage Advisory. It is recognized that well-managed onsite sanitation is likely to play an important role in providing adequate sanitation. It is evident that the effective faecal sludge management would be a key element in making onsite sanitation system sustainable.

Faecal Sludge and Septage Management have been a neglected area. It has not received adequate attention in academic institutions. Many engineering and planning schools still focuses on design of conventional sewerage system and STP. This course aims to raise awareness on important aspects of Faecal Sludge and Septage management. Students will learn the basics of FSSM and its service chain; suitable technical options available across the service chain and design of treatment technologies; institutional and financial aspects of FSM; and Private sector engagement in the FSM sector.

### Course Format

The course will consist of lectures, PowerPoint presentations, Case studies, videos, interactive discussion and group exercise. The course will also comprise of assignments and tests.

## Course Outline & Schedule

### Module 1: The Basics

This module will give an overview of sanitation situation in India and highlight the need of FSSM. Recognition of FSSM under the current SBM programme and new national policy on FSSM will also be discussed in detail.

The course will familiarize students with the basic terminology and concepts of the onsite sanitation system. Sanitation service chain for FSSM will be explained in detailed across Access>Collection>Conveyance>treatment >reuse.

#### Topics:

1. Introduction
  - ❖ Overview of Sanitation situation in India
  - ❖ Need for FSSM- referencing SDG, SBM, FSSM national policy
2. Fundamentals of FSSM
  - ❖ General Introduction of Faecal Sludge and Septage Management
  - ❖ Introduction to Sanitation Service Chain
  - ❖ Characterization of FSM

### Module 2: Planning for FSSM

This module will focus on citywide assessment and planning for FSSM. It will give a brief overview on how and what information needs to be collected to assess existing FSSM services in the city. The students will be explained different processes involved in planning FSSM and will be familiarized with different tools available for it.

#### Topics:

3. Assessment of FSSM across the sanitation service chain
4. Planning of FSSM
5. FSSM tools- SFD, SaniTab, SaniPlan, FSM toolkit

### Module 3: Technology options across service chain

In designing an FSSM services, it is important to plan and assess technology options for each link in the service chain. This ranges from appropriate toilets and onsite systems such as septic tanks to conveyance as well as treatment and reuse. Demand versus scheduled desludging will be discussed in detail. The session will also provide guidance on various parameters that need to be considered to select appropriate technology across sanitation service chain based on local conditions. The session will discuss different treatment technologies and its designing approach. The possibility of cocomposting of FSSM with solid waste, cluster-based faecal sludge treatment plant and reuse market of treated septage and wastewater will also be discussed.

**Topics:**

6. Assessment of technical options for toilets and septic tanks
  - ❖ Operational factors that impact the variability of fecal sludge like use of toilet, storage durations, collection method, etc.
7. Collection and Transportation of Fecal Sludge
  - ❖ Technical options for emptying services and conveyance
8. Treatment Technology option for FSM
  - ❖ Options for treatment and reuse of fecal sludge/ septage
  - ❖ Selection of treatment technology

**Module 4: Financial Planning and Involvement of private sector**

This module will make students familiar with the practice of how sanitation projects are financed by the city government. The session will start with an assessment of financial requirements for both capital and O&M expenditures for implementation of FSSM in the city. It will also provide guidance on potential sources of finance for meeting these expenditures through external grants, private sector investments, user contributions, external debt or through local government internal resources. The session on the private sector involvement will focus on understanding the current role of private sector providers in the emptying and treatment services of FSSM. The detailed process involved in structuring and formulation of private sector contracts will also be discussed.

**Topics:**

9. Financial Assessment
  - ❖ Assessment of required finance for the IFSM project
  - ❖ Finding potential sources for capital expenditure as well as O&M
  - ❖ Assessment of charges to be levied on people and their willingness to pay for this service
10. Potential of Private Sector in IFSM
  - ❖ Landscape Study of Private Sector- Interview guide for Private Sector Players
  - ❖ Review of potential structure of PSP option

**Module 5: Institutional, Regulatory and Policy Framework**

This session will provide an understanding of prevailing enabling and regulatory environment as well as the capacity of local government to manage the citywide FSM services. The session will focus on understanding the policies and regulations at National, state and local levels related to FSM provision. The institutional set-up and roles and responsibilities of various stakeholders involved in planning, regulating and monitoring of FSM will be discussed in some detail.

**Topics:**

11. Assessment of policies and regulations at local level that can affect FSM
12. Institutional Assessment of local government
13. Stakeholders assessment and Involvement

# Lovely Professional University (LPU), Punjab

Department of Urban Planning, Lovely Professional University initiated several activities as a part of the MoU signed with NIUA. Presentation on the same was made before the NIUA team on 4th October, 2018.

In the Presentation, the visiting team was apprised about the various activities and efforts made by the Department of Urban Planning, Lovely Professional University to propagate and promote the sanitation program in the areas which lack or suffer from acute problems.

New Course titled URP 820: Sustainable Sanitation System for Indian Cities was made an integral part of the course curriculum of M.Plan and B.Plan students (All Batches), as an elective subject. Syllabus along with detailed Instruction Plan was discussed with the team of experts. Instruction Plan is prepared by the department, in light of current issues and challenges in Indian cities, comprises of day wise schedule for the classes, academic tasks and references. Topics like Wastewater Quantity Estimation and Quality Enhancement, Sewerage Treatment mechanism, Economics/ Financial aspect of Sewerage system, On-site sanitation systems / Faecal Sludge and Septage management, Preparation of City Sanitation Plan etc are made part of the new introduced course

Schedule of Workshop on Community based technologies for Domestic Wastewater Treatment and Reuse was also introduced and discussed in the meeting. Resource Persons, target groups along with topics for the workshop was finalized on the basis of valuable suggestions given by experts. The workshop was organized from 25<sup>th</sup> to 27<sup>th</sup> October 2018, at Lovely Professional University. It focused on Waste water and Waste water management, current Sanitation issues in Indian Cities, Treatment systems, Planning and implementing waste water reuse projects, modern technologies and best practices. Besides this, discussion was held on the site visit tool kit and planning approaches for decentralized and onsite sanitation plan.

Thirdly, Certificate Short Course for working professionals: Planning and Design for Efficient Sanitation System is planned in March 2019 at Lovely Professional University. Resource persons, Schedule and target groups for the certificate short course was discussed with the NIUA Team.

Topics to be undertaken during the course will be Introduction to sanitation planning, Semi-Centralized and De-centralized sanitation system, Different perspective of sanitation, Best practices of sanitation systems & technologies, Waste water and Septage management and FSSM Planning etc.

The NIUA Team was briefed about the LPU's initiative of Preparation of City Sanitation Plan, Dalhousie. Students of the department conducted door to door survey of the whole Dalhousie city and also conducted specialized surveys and studies to understand the various sanitation issues of the city. Besides this, data was collected from the various government offices like Irrigation and Public Health, Municipal Council, Sub Divisional Magistrate etc. which was necessary to have a deep knowledge on the city's current sanitation challenges, initiatives, policies, ongoing schemes and level of awareness among the officials regarding the sanitation aspect.

Brief objective of the various initiatives taken by NIUA on Sanitation improvement across the country was discussed. The experts also deliberated on capacity building programs undertaken by them. It was stressed that the university should be encouraged by introducing capacity building program on the subject of urban sanitation improvement

Experts suggested that the university should engage itself in promotion of sanitation in India and sensitization, to the students by introducing Minor electives, Certification courses, Short term or training courses. Modules prepared by SCBP which are available on the website were also highlighted.



# Annexure 3: Engineering

## Civil Engineering Department, College of Engineering, Pune (CoEP)

The Civil Engineering Department at CoEP Pune, Developed and Elective Course Outline, Winter School and has proposed a Faculty Development Program (FDP) on Decentralized Liquid Waste Management under SCBP engagement.

### Departmental Elective Course- Decentralized Liquid Waste Management

Teaching scheme	Examination scheme
<b>Lectures:</b> 3 hours/week	100 marks Continuous Evaluation <b>Assignment quizzes:</b> 40 marks <b>End semester exam:</b> 60 marks

#### Learning goals

After taking this module students will be able to;

1. To understand the current situation and challenges of the wet infrastructure in the developing countries.
2. To understand the types of wastes and sanitation systems especially focusing the hybrid sanitation.
3. To understand in detail about the various technologies involved in decentralized wastewater treatment.
4. To understand the faecal sludge and septage management focusing collection, conveyance, treatment and reuse.
5. To understand co treatment of faecal sludge and septage in sewage treatment plant.

#### Methodology

Presentation, Learning Notes, Exercises, Assignments, Case studies and Field Visits

#### UNIT I :7 hours

Water and sanitation in Developing Countries

##### Definition and objectives

Environmental health, Water Supply and

Environmental Sanitation, Resource and waste systems, Objectives and principles of water supply and sanitation systems

##### Environmental health

Global burden of diseases, Transmission of pathogen related diseases and its disruption

##### Urban Challenges

Major deficiencies and challenges in urban water and sanitation, Challenges faced at various levels i.e. households, city and national.

#### UNIT II: 7 hours

Sanitation systems

##### Definition and objectives

Sanitation and its objectives, Sanitation Systems, Difference between "Access to Basic" vs "Access to Improved" Sanitation

##### Introduction

Generation of waste products, Parameters used to describe wastewater, Characteristics of waste products and their "Value"

##### Sanitation value chain – Hybrid sanitation

Functional groups through which waste flows, Objectives of each function group, Classification of sanitation systems, Feasibility of sanitation systems, Case studies

#### UNIT III: 7 hours

##### Sanitation technologies- Hybrid Sanitation

User interface - different types of toilets, their feasibility and case studies; Storage and containment – different types of storage and containment units and their applicability, case studies; Conveyance options for solids and liquids – case studies; Treatment options and feasibilities, case studies; Disposal & reuse – options, standards, best practices.

## UNIT IV:7 hours

### Faecal Sludge and Septage Management I

#### Definition and objectives

What is faecal sludge and septage and why it needs to be managed? Current practices in India, Objectives of Faecal Sludge and Septage Management.

#### Introduction

Source of faecal sludge and septage, Characterisation of faecal sludge and septage, Parameters used to describe septage, Rate of generation, Quantification of faecal sludge and septage, Demand and scheduled desludging-advantages and challenges; case studies and good practices

## UNIT V: 7 hours

### Faecal Sludge and Septage Management II

Conveyance of faecal sludge and septage

Human powered mechanical equipment, Motorized mechanical equipment, Case studies.

Treatment of faecal sludge and septage

Treatment objectives of faecal sludge and septage, Treatment options for faecal sludge and septage, Treatment stages of faecal sludge and septage, Treatment components of faecal sludge and septage

## UNIT VI: 7 hours

Co treatment of Septage and Sewage

Faecal sludge and septage biodegradability and fractionation, Characterisation ratios, Co treatment of septage in activated sludge process treatment, Impact on primary, secondary treatment units, Anaerobic co treatment of faecal sludge and septage, Practical considerations for treatment.

## COEP WINTER SCHOOL

Civil Engineering Department, College of Engineering Department organized a winter school for 30 students from Civil Engineering and Urban Planning Department from 18-21 Feb 2019 at CoEP, Pune. Prof Pratap Raval, Head of Department conducted the sessions with support from SCBP partners.

The sessions included overview of water and sanitation in developing countries, urban challenges, non-technical aspects and sanitation systems. The group work assignments focused on process of wastewater and FSSM treatment and design of the treatment components. Visits to CoEP Hostel Campus and plumbing lab of Indian Plumbing Association inside the CoEP campus were organized as part of exposure visits.

## FACULTY DEVELOPMENT PROGRAM

CoEP Pune has proposed a Faculty Development Program on Integrated Wastewater and Septage Management inviting faculties from 20 universities from Maharashtra. This program will be held at CoEP from 16-20 March 2019. \

The faculties will be oriented on detailed concepts of sanitation systems and technologies along with various components of wastewater treatment. The FDP will enable faculties to design and run courses on non-networked sanitation in their respective universities, thereby help scale-up such courses across academia.



# Department of Biological Sciences, Birla Institute of Technology and Sciences (BITS) Pilani, Goa Campus

Few capstone Projects for students/PhD scholars of BITS, Goa were supported by SCBP for testing of innovations for faecal sludge and septage management. Five projects have been proposed

- ❖ Project 1: Development of appropriate techniques to detect viable eggs.
- ❖ Project 2 : Lab scale optimization experiments to monitor biomass in the effluent
- ❖ Project 3: Design a toilet pan that effectively

separates solids and liquids (anal cleansing and flushing water).

- ❖ Project 4 : Terra Preta composting of the faecal solids and constructed wetlands treatment of the liquid effluent under process conditions.
- ❖ Project 5: Effective killing of helminthes eggs during anaerobic digestion of septage. *(Pictures of the anaerobic digestors is shown below)*



# Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur

## Two Weeks Certificate Course on Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions

KIT organised a Certificate Course on Global and National Perspective of Sustainable Sanitation Approaches and Technology Interventions from 26<sup>th</sup> November to 8<sup>th</sup> December, 2018. The course comprised of the following activities:

1. Expert Lectures and Invited Talks by representatives from Government and Non-Governmental Organizations, Academic and Research Institutions, Consultants and Experts in the field of Sustainable Sanitation etc.
2. Site Visits and
3. Demonstration Sessions / Case Studies / Laboratory Sessions

### Objectives

1. To undertake the planning and programming of investments in basic environmental sanitation based on socioeconomic, technical and financial criteria;
2. To strengthen the technical, financial, administrative and operating capacity of the institutions in the basic environmental sanitation sector;
3. To encourage environmentally sustainable sanitation promotion activities, which are basic to the success of water supply and sewerage programs, especially in rural areas and marginal urban areas; and
4. To strengthen systems that improves the identification, selection, preparation and evaluation of projects, in accordance with generally accepted standards.

### Outcomes

At the end of this certificate course the participants will be able to,

1. Understand global and national challenges in the field of sustainable sanitation.
2. Discuss technological advancements in the traditional sanitation practices by appropriate technology interventions.
3. Assess the resources, town's sanitation needs; priorities interventions, investments, cleanliness, socio-economic aspects and behavior change in sustainable sanitation.
4. Facilitate production of a Sanitation Development Plan and adopt appropriate and consistent standards and policies.
5. Develop approaches for sustainable sanitation in large scale models especially in rural and urban areas.

### Target Audience

The course is designed for the participants such as:

1. National, Regional and Local Government Representatives.
2. Academic Leaders, Faculties, UG and PG Students and Research Scholars.
3. Small Scale Entrepreneurs, Consultants, Architects, Engineers, Practitioners, Designers and Representatives from Industries.
4. Representatives from Non Government Organizations and Environmentalists.
5. Village Nominated Representatives, Women Self Help Groups, Policy Makers and Private Organizations.



# Annexure 4: Management

Xavier Centre for Urban Management and Governance, XAVIER University, Bhubaneswar

## Course Outline

### **Certificate Course on Non-Networked Sanitation Management**

Urban sanitation now poses a tremendous challenge, given rampant urbanization and inadequate development of networked sewerage systems. Accelerating development or extension of networks is unlikely to address this; the high cost, long gestation period and water-intensive nature of centralized sewage networks in fact make it an unviable option, particularly in the rapidly growing small towns and urban peripheries. Decentralized, non-networked solutions are more viable and likely to more effectively meet the sanitation challenge, and are therefore emerging as the preferred options in the AMRUT program, various Missions and by international agencies.

Currently, the understanding and expertise required for non-networked sanitation is very sparse in the country. Academic programs and courses typically focus on the conventional technologies, networked systems and state financing, and knowledge of alternative systems and PPP arrangements are missing. To bridge this gap and develop the requisite expertise, the Xavier Center for Urban Management and Governance (XUMG) of Xavier University, offers a unique three-week Certificate Program in (Non-networked) Sanitation Management (CCSM), with the support of the SCBP of the NIUA. The CCSM is designed to be useful for professionals, government officers, consultants and post-graduate students desirous of understanding non-networked sanitation, and developing the capability to design, develop and manage such systems. Professionals from urban local bodies, parastatal organizations for liquid waste management, consulting organizations and academics, researchers and students specializing in this domain are encouraged to take this course.

### **Course Objective**

This course will provide participants with a comprehensive understanding of the planning, financing, development and management of non-networked sanitation systems.

## Learning Goals

- Understand status of urban sanitation in Indian cities, and related policies and programs.
- Develop the skills to plan for urban sanitation, including need-demand assessment, consideration of feasible technology options and financing models, and development of DPR.
- Learn the process of procurement and contract management in non-networked sanitation
- Know the operational challenges and management approaches for the commissioned system.
- Be familiar with social marketing strategies to meet stakeholder on-boarding and service challenges and achieve established and new service level benchmarks.

## Course Format

The course is designed will engage participants for three weeks (102 contact hours). Learning will be through classroom lectures, group exercises, case discussions, role plays and site visits. A live case (or cases) will be taken up for the exercises and assignments. Learning materials will be provided in advance. Evaluation will include assignments, quizzes and case completion. A Certificate in Non-Networked Sanitation Management will be awarded to all participants who successfully complete the course.

## Course Outline

### Module 1: Sanitation Planning

Prior to diving into the management aspect of non-networked sanitation, the first module will establish the theoretical and technical foundation of urban sanitation for the participants. The module will introduce them to the sanitation ecosystem, existing scenario of wastewater management in Indian cities, and familiarize them to the legislation, policies and guidelines on urban sanitation in the country. Participants will further be guided to use different planning techniques to assess and extrapolate sanitation demand - supply gap, identify stakeholders, and evaluate non-networked sanitation technological options based on different factors across the value chain.

#### Topics

- **Wastewater management in cities**
- **Data and trends w.r.t. components and SLBs**
- **Sanitation demand assessment and scoping**
- **Sanitation systems (technologies) and their evaluation**
- **FSSM ecosystem including value chain**
- **Stakeholders in sanitation**
- **Guidelines and policies**

## References

- Faecal Sludge Management - Systems Approach for Implementation and Operation - IWA Publishing
- Strategic Planning for Municipal Sanitation – a Guide – GHK Research and Training
- Sanitation21 - Simple Approaches to Complex Sanitation - IWA Publishing
- Integrated Wastewater and Septage Management - Training of Trainers Manual - SCBP
- Faecal Sludge and Septage Management - an Orientation and Advanced Modules - SCBP
- Sandec Training Tool 1.0 - Water and Sanitation in Developing Countries – Module 1 - EAWAG
- Sandec Training Tool 1.0 - Faecal Sludge Management (FSM) – Module 5 - EAWAG
- Technology Options for the Sanitation Value Chain - CSTEP
- Acts, Policies and Guidelines
  - National Urban Sanitation Policy – 2014
  - Advisory Note - Septage Management in Urban India – 2013
  - National Policy on Faecal Sludge and Septage Management (FSSM) – 2017
  - Guidelines for Swachh Bharat Mission – Urban – 2017
  - AMRUT Mission Statement & Guidelines – 2015
  - The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013
  - Odisha Urban Sanitation Policy – 2017
  - Odisha Urban Sanitation Strategy – 2011
  - Manual on Sewage and Sewerage Treatment - CPHEEO – 1993

## Module 2: Procurement and Contract Management

This module will demonstrate the participants in resource and contract management using projects on non-networked sanitation as case-studies to work on. It will focus on evaluating stakeholders and conducting feasibility studies that would help them decide the extent and nature of involvement of private and non-government agencies in a project, and assigning them with contracts to manage the available assets optimally. The module will also cover tendering process, preparation and appraisal of RFPs, DPRs, Environmental Assessment Report, NOCs, project planning and scheduling.

### Topics

- **Feasibility studies and DPR**
- **Formulation of RFP**
- **Asset (land and location) planning**
- **Project planning and scheduling**
- **Contract management and arbitration (Scheduling, monitoring and upscaling)**
- **Available and conventional technologies/products**
- **Empaneling vendors; related agencies and vendors**
- **Project handover and transfer**

### References

- DPR-FSSM : Collection , Transport and Treatment for Port Blair, Andaman & Nicobar Islands
- Training Module on Preparation of Detailed Project Report for Faecal Sludge and Septage

Management - Workbook on Planning and Designing of FSTP – SCBP

- Tender document of RFP setting up of Faecal Sludge and Septage Treatment Plants (FSTPs) in urban local bodies of Andhra Pradesh
- Initial Environmental Examination Report – FSM Solutions for Lalsot, Rajasthan

## Module 3: Financing

The module will first cover methods to estimate the overall capital and O-M cost of a non-networked sanitation project of a city, followed by identification of all the possible financial institutions and revenue sources in order to develop a scenario based stage wise budgeting model to make the project economically sustainable. The module will also demonstrate the use of web-based tools to help professionals choose optimized technological options, decide role of PPP, private agencies and tax payers, and propose financial safety nets across the life cycle of the project.

### Topics

- **Financing mechanisms and institutions**
- **Scenario based stage wise budgeting**
- **Component wise profitability analysis**
- **Financial and technology assessment tools**
- **Private and PPP models in sanitation and innovations**
- **Cost optimization in technology operations (including life-cycle cost)**

### References

- Towards More Sustainable Faecal Sludge Management Through Innovative Financing Selected Money Flow Options - Doulaye Koné, BMGF
- Technology Options for the Sanitation Value Chain – CSTEP
- Financial and technology assessment tools
  - [SaniPlan - IFSM](#)
  - [FSM Toolbox](#)
  - [Sanitech Manual](#)
  - [WASHCost India](#)
  - [Sanitation Mapper](#)

## Module 4: Operations and Maintenance

The module will introduce the participants with the administrative organogram alongwith the roles and responsibilities of the involved government bodies influencing the sanitation management of a city. It will also discuss assessment of citizen groups, non-government agencies and other stakeholders in the value chain, and use of social mobilization techniques to involve them in the over-all functioning of the system. The module will additionally cover management of livelihood and human resources, stakeholder conflict resolution and rehabilitation of Project Affected Persons (PAPs) at all stages of value chain.

## Topics

- **Commissioning and operational organogram**
- **Job roles and job description**
- **Industry outreach and talent scouting**
- **Citizen groups and committees**
- **Public participation citizen engagement initiatives**
- **Campaigns and mass outreach for awareness building and diluting misconceptions**
- **Advocacy based decisions, negotiation/conflict resolution**
- **Project Affected Persons (PAPs) rehabilitation strategy**
- **Livelihood management and skill development / convergence for certain stakeholders**

## References

- Integrated Wastewater and Septage Management - Training of Trainers Manual – SCBP
- Sandec Training Tool 1.0 - Planning for Environmental Sanitation – Module 7 - EAWAG
- Handbook on Decentralised Wastewater Treatment Module – NIUA
- Septage Management - A Practitioner’s Guide – CSE
- <https://practicalaction.org/sanitation-odisha>
- Burden of Inheritance – WaterAid
- [Welfare Schemes](#) under National Commission for Safai Karmacharis
- Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS)
- Integrated Low Cost Sanitation Scheme

## Module 5: Performance Assessment

The module will demonstrate the use of Key Performance Indicators (KPIs) and Service Level Benchmarks (SLBs) already established and developed and adopted widely to assess the performance of a sanitation project. Project reviewing and quality control monitoring, both during the construction and operation of the project will be illustrated to the participants.

## Topics

- **Accountability checks and review meetings**
- **Monitoring and quality control**
- **KPI and SLB based comparative evaluation**

## References

- <https://practicalaction.org/sanitation-odisha>
- [PAS – UMC](#)
- Septage Management - A Practitioner’s Guide – CSE

## Course Coordinators

Prof. Kajri Misra; Prof. Mayank Dubey and Prof. Nalin Ranjan

# Annexure 5: Humanities

## Centre for Public Affairs and Critical Theory (C-PACT) Shiv Nadar University, Noida

SNU's Water Science and Policy (WSP) Programme is a unique programme, offering a Masters degree in 2 years, along with several one month Certificate programmes, and a year long Diploma. Its design is a pedagogic innovation, bringing together regular full time students (MSc) with several mid-career government officers, activists and development workers in civil society organizations, and such others (Certificate and Diploma programmes) whose experience adds immense value to the expert-led teaching that happens in the classrooms.

The WSP programme realizes that in order to challenge the prevalent understanding of urban sanitation and urban water management, there is an absolutely undeniable need for a new paradigm in urban water management and governance. While the integration of the urban planning and engineering and social sciences are important, it is also important for students to see, map and grapple with, where possible, the challenges of urban water and waste management. A fresh graduate who comes into the professional world today, as well as today's planners and policy makers, need to understand that many concepts and theories that we take for granted today have to be challenged. These concepts are no longer relevant for our world where unsustainable and unequal development and pollution of precious and limited water sources have to be stopped.

Complementing and tied closely with the WSP agenda, this proposal focuses:

- ❖ on conceptual challenges and capacity building for public policy makers involved in urban waste and urban water (faecal sludge management in particular) and
- ❖ on development of new teaching material (curriculum) and methods for students to engage with and learn from decentralized urban sanitation systems

### Proposed Workshop on Water-Waste Cognition

The argument we make is that what we know depends on how we know. "What we know"

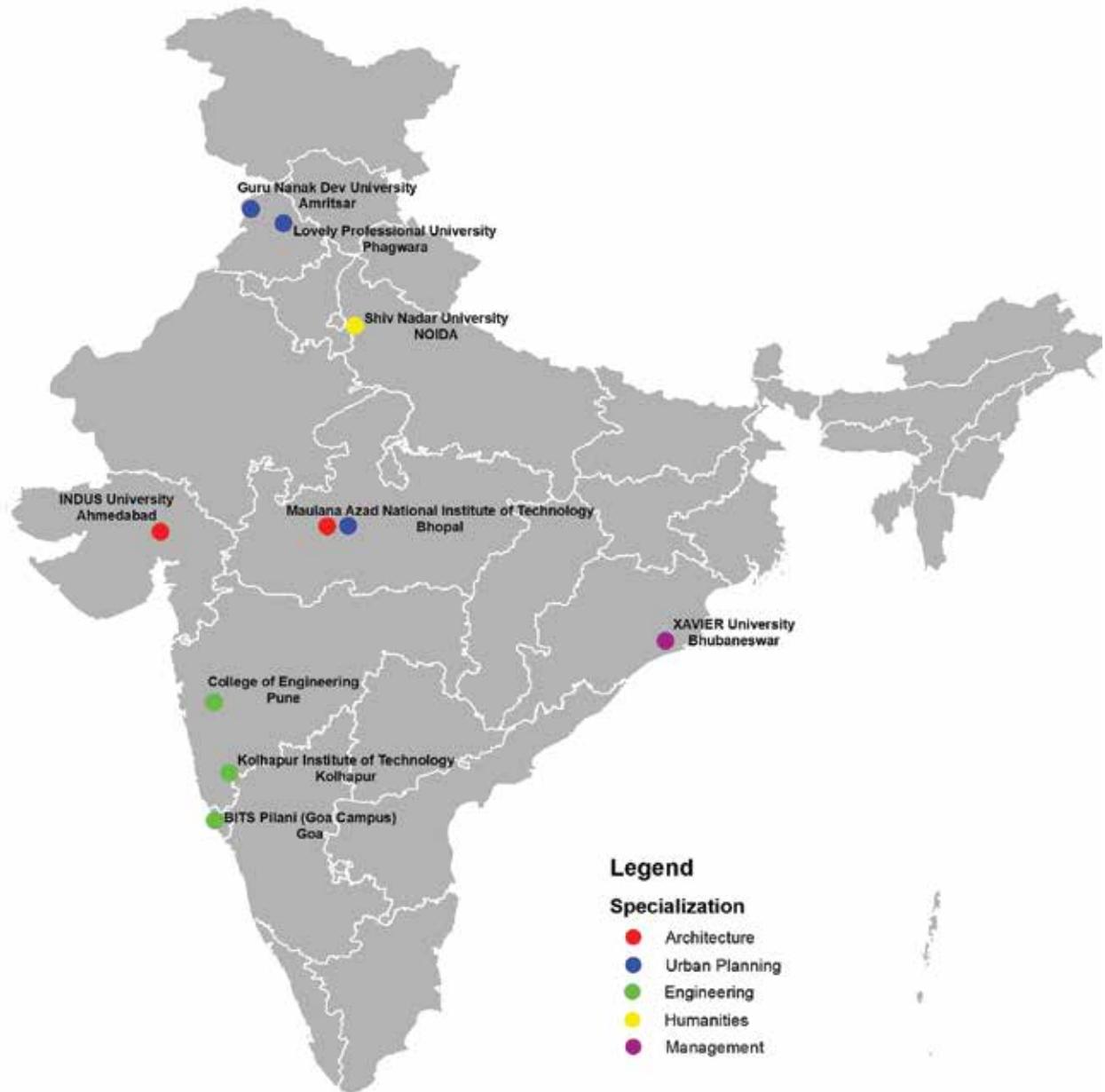
as water problems, solutions, implementation of solutions, costs, pricing, is explicit, based on evident measurable levels of pollution, incentives or punitive measures to reduce or clean up pollution, willingness to pay (WTP) for clean water and clean urban environment. But what is explicit here, in these problems and solutions, is based on several implicit values, concepts and theoretical frameworks that we take for granted. For instance, is it enough to regulate the level of pollution (say SO<sub>2</sub> in air, or faecal sludge or BOD in water) or is it important to stop the pollution – as completely as is possible, given our advanced knowledge and sophisticated engineering skills? Thereby, "How we know" water problems, solutions, implementation of solutions, costs, pricing, etc., whether as unpolluted streams and rainwater catchments or as treated chemically certified water, is built on several important concepts in the sciences – natural and social. These implicit assumptions are now being confronted on a daily basis on many fronts – in a school where children drink polluted water, in a city in the backwaters with no safe drinking water, in water rights bought from the state government by the corporate soft drink manufacturer, in citizens opening their own household toilets into open drains and demanding that municipal corporations supply clean safe water, and many such.

How we know shapes what we know: There are several theories and concepts that a decentralized sanitation system confronts. Unless these concepts and the hidden assumptions that they lend to planning, financing and governance mechanisms are deconstructed, and alternatives analysed, there is little scope for decentralised sanitation systems to become socially, economically, politically and scientifically institutionalised.

SNU-CPACT through its WSP programme shall organise a two day academic seminar in March 2019, involving academics/professionals in urban planning, engineering, and social sciences.

# Annexure 6

## SCBP Partner Universities



### Legend

#### Specialization

- Architecture
- Urban Planning
- Engineering
- Humanities
- Management





#### About NIUA

NIUA is a premier national institute for research, capacity building and dissemination of knowledge in the urban sector, including sanitation. Established in 1976, it is the apex research body for the Ministry of Housing and Urban Affairs (MoHUA), Government of India. NIUA is also the strategic partner of the MoHUA in capacity building for providing single window services to the MoHUA/states/ULBs. The Institute includes amongst its present and former clients Housing and Urban Development Corporation, Niti Ayog, City and Industrial Development Corporation of Maharashtra, USAID, World Bank, Asian Development Bank, GIZ, UNICEF, UNEP, UNOPS, Cities Alliance, Bill & Melinda Gates Foundation, Rockefeller Foundation, Global Green Growth

#### About SCBP

Sanitation Capacity Building Platform (SCBP) is an initiative of the National Institute of Urban Affairs (NIUA) for addressing urban sanitation challenges in India. The 3 year programme (starting 2016) is supported by a Gates Foundation grant. It is aimed at promoting decentralised urban sanitation solutions for septage and waste water management. The Platform is an organic and growing collaboration of universities, training centres, resource centres, non-governmental organizations, consultants and experts. The Platform currently has on board CEPT University, CDD Society and BORDA, ASCI, AILSG, UMC, ESF, CSE, WaterAid, CPR, iDECK, CSTEP and WASHi. The Platform works in close collaboration with the National Faecal Sludge and Septage Management Alliance (NFSSMA).

#### About CEPT University

'Centre for Environmental Planning and Technology' - CEPT University, Ahmedabad focuses on understanding, designing, planning, constructing and managing human habitats. CEPT and its five schools have been pioneers in planning, architecture and related education in India. The Faculty of Architecture was established as the 'School of Architecture' in 1962. It focuses on design in the private realm. The Faculty of Planning, focused on planning in the public realm, was established in 1972 as the 'School of Planning'. The Faculty of Technology, which concentrates on engineering and construction, was established in 1982 as the 'School of Building Science and Technology'. The Faculty of Design was established in 1991 as the 'School of Interior Design'. It deals with habitat related interiors, crafts, systems, and products. Faculty of Management was established in 2013 and it focuses on Urban Management. Substantial work has been done by CEPT in urban water and sanitation sector with focus on non-sewered sanitation over last few decades as part of its post graduate courses in Infrastructure Planning and of late through the various activities of Centre for Water and Sanitation (C-WAS) at CEPT University. For more information, kindly visit CEPT's website: [www.cept.ac.in](http://www.cept.ac.in)

#### About C-WAS

CEPT's Center of Water and Sanitation (C-WAS) carries out various activities – action research, training and advocacy to enable national, state and local governments to improve delivery of urban water and sanitation services. C-WAS began its work in 2008, when CEPT University received a grant from the Bill & Melinda Gates Foundation (BMGF) for Performance Assessment System (PAS) Project. This activity now covers six states and 900+ cities in India, and has become a major repository of urban water and sanitation database in India. C-WAS has developed methods, models and tools for sanitation service level assessments, city sanitation planning, faecal sludge and septage management (FSSM) and planning, and innovative sanitation financing. C-WAS provides support to state government in terms of policy, capacity building and project monitoring and support to towns for implementation of sustainable and equitable sanitation. The ODF/ODF+/ODF++ framework was conceptualized by CEPT team in partnership with Government of Maharashtra and later this framework is adopted by Government of India. Various publications of C-WAS on water and sanitation assessments are available at [www.cwas.org.in](http://www.cwas.org.in)



National Institute of Urban Affairs

## National Institute of Urban Affairs

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