Sanitation Capacity Building Program

TRAINING ON

INTEGRATED WASTEWATER AND SEPTAGE MANAGEMENT

EXPOSURE VISIT REPORT

DEC 21ST- DEC 23RD , 2017

ECOSAN SERVICES FOUNDATION

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The exposure visit report is prepared to facilitate the coordination with Ecosan Service Foundation and National Institute of Urban Affairs. The report elaborates on the training given to the officials of urban local bodies from Bihar, Chhattisgarh, Uttarakhand on Integrated wastewater and septage management and details of the sites visited at Pune under exposure regarding the integrated wastewater and septage management practices.

Prepared by;

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For

National Institute of Urban Affairs

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Abbreviations

ESF	Ecosan Services Foundation
FSSM	Faecal Sludge and Septage Management
GoI	Government of India
IHT	Individual Household Toilet
MLD	Million Litres per Day
NIUA	National Institute of Urban Affairs
RCUES	Regional Centre for Urban and Environmental Studies
ODF	Open defecation free
PMC	Pune Municipal Corporation
PLC	Programmable Logical Control
SCADA	Supervisory control and data acquisition
SCBP	Sanitation Capacity Building Program
STP	Sewage Treatment Plant
ULB	Urban Local Body
IWSM	Integrated Wastewater and Septage Management

1 Introduction

The water and sanitation sector in India needs reforms if national and global benchmarks for service delivery are to be met with success. The current plight of the sanitation sector and the huge gaps faced by roughly 800 million Indians in accessing sanitation provisions. This highlights the need for not just institutional remodelling of the sector, but also for a novel approach, innovative ideas and urgent decentralization if the sanitation services are to reach the last common denominator. However, decentralization of treatment system (anaerobic process), leads to generation of faecal sludge. These systems need to desludged at a regular interval to maintain their performance.

Faecal sludge management (FSSM) refers to the removal, treatment, and disposal of faecal sludge from holding tanks (septic or networked through sewerage pipes). Faecal sludge is different from overall sewerage and in that it contains mostly human bodily waste rather than the waste that drains from kitchens, etc.

The Government of India's (GoI) goal is for all cities to have networked sewerage connections, which would send faecal sludge to a central location for treatment and disposal. Presently, 95% of urban local bodies (ULBs) do not have this infrastructure. This means that septic tanks or pits have to be emptied and moved to a location that will process the faecal sludge. In higher end apartment complexes and business centres, there are on-site FSSM solutions; however, it remains a challenge even here where space and options for dumping the treated waste are limited. On the other hand, in poor settlements (slums), latrines are often built so the waste just empties directly outside it. This practice not only has the potential to contaminate the water sources and pollute the environment within the slum, but also the whole surrounding area.

There is little regulatory power to monitor whether faecal sludge is processed according to environmental and health standards. Most cities in India lack the capacity to regulate treatment and dumping of waste. There is also a lack of approved sewage treatment plants (STPs) in the country to safely and effectively treat faecal sludge, if it is actually collected and able to be sent there. Twenty-Seven Indian cities have only primary treatment facilities and 49 have primary and secondary treatment facilities. Due to the lack of functioning STPs and adequate enforcement of regulations, untreated faecal sludge is disposed indiscriminately into water bodies,

drains, landfills, and vacant lands. In Bhubaneswar, Orissa for example, untreated faecal sludge is often dumped directly into the sea. As with the on-site FSSM options, city wide STPs often still have the problem of responsibly dealing with the treated sludge.

Given these issues of collection, treatment, and disposal, it is exciting that innovators are starting to look to this waste as a resource rather than burden. While there is value of innovation at each level of the sanitation chain, mostly due to the human resource and health potential in infrastructure building and collecting waste, there is additional value add in turning the faecal sludge matter into an environmentally beneficial and profitable resource.

NIUA has been supporting the RCUES Lucknow in capacity building in the field of integrated wastewater and septage management. As one of the activity, the exposure visit will be organized which can give an opportunity to the state and ULB officials to understand the management of wastewater and septage at a city level. The objectives of this activity were to provide exposure to the officials about the environmental planning and execution of wastewater and faecal sludge management systems at city level and to produce case studies which can be potentially be used to their own area.

2 List of Participants and Staff

The training cum exposure visit was arranged with cooperation of RCUES, Lucknow and NIUA, Delhi. Upon the reqest from the RCUES, Lucknow, NIUA had arranged this visit. The officials were nominated by different states such Bihar, Chattisgarh and Uttarakhand.

The following table presents the details of the officials, staff who has undergone a two and half day training on Integrated Wastewater and Septage Management in city combined with Exposure Visit to sites demonstrating sustainable processes for liquid and solid waste management.

TABLE 1: LIST OF PARTICIPANTS AND STAFF

Sr. No	Name	Designation	ULB, Organisation/Company	Mobile	Email
1	Sri Arbind Kumar Jha	Joint Secretary cum- Assistant Director	Bihar	9431277900	Arbi.jha@gmail.com
2	Sri Sushil Mishra	Executive Officer	Supaul	9934208818	sushil.bas@gmail.com
3	Sri. Bipin Kumar	Executive Officer	Bettiah	9472346286	drbipin6@gmail.com
4	Sri Kuldeep Gupta	Assistant Engineer	Bhilai	9302893103	kuldeepg1296@gmail.com
5	Sri Prakash Thawaney	Assistant Engineer	Bhilai Charoda	9425513574	cmobhilaicharoda@gmail.com
6	Sri Piyush Rajput	Deputy Engineer	Korba	7773009922	psrajput17@gmail.com
7	Sri Ankur Agrawal	Deputy Engineer	Durg	8770450386	ankur.nd.ankur@rediffmail.com
8	Sri Dilip Markam	Deputy Engineer	Rajnandgaon	9301670006	dilipmarkam@gmail.com
9	Sri Ashok Kumar Pande	Commissioner	Roorkee	7500988789	nagarnigamroorkee@gmail.com
10	Sri Jai Bharat Singh	Commissioner	Rudrapur	9456334433	nagarnigamrudrapur@gmail.com

3 Agenda of the Exposure Visit

The following table represents the details of the scheduled discussion sessions, site visits

TABLE 2: AGENDA OF THE EXPOSURE VISIT

Time	Day 1: December 21st, 2017
9.30 am-10.00 am	Registration
10.00 am-10.30 am	Welcome Introduction, setting ground rules! Understanding expectations, aims and objectives.
10.30 am- 11.00 am	Towards ODF cities and beyond!
11.00 am-11.30 am	*Coffee Break*
11.30 am-12.30 pm	Sustainable Sanitation and Water Management
12.30 pm-1.30 pm	Lunch
1.30 pm- 2.15 pm	Designing of Sanitation Systems
2.15 pm- 3.30 pm	Exercise: Identifying your system!
3.30 pm- 4.00 pm	Coffee Break
4.00 pm- 4.45 pm	Sanitation Systems and Technologies
4.45 pm- 5.00 pm	Group Discussions: Identifying appropriate systems for your city
Time	**Day 2: December 22nd, 2017**
10.30 am-11.00 am	Assembly for site visit
11.00 am- 12.30 am	Site Visit: Sewage Cure (College of Engineering, Pune)
12.30 pm- 1.30 pm	Lunch
1.30 pm- 3.00 pm	Site Visit: Soil Scape Filter (Indrashanushya Citizen Centre)
3.00 pm- 4.30 pm	Site Visit: STP Activated Sludge Process(Erandwane)
Time	**Day 3: December 23rd, 2017**
9.00 am-9.30 am	Assembly for site visit
9.30 am- 11.30 am	Site Visit: Organic waste management plant (Peshwe Park)
11.30 am-12.30 pm	Lunch
12.30 pm	End of the Exposure Visit

4 Sessions

Day 1, December 21st, 2017

The day was started with a round of introduction of trainers and partners of SCBP and the participants. Post introduction Mr. Depinder Kapur representing NIUA, introduced SCBP. He also explained the aim and objectives of the training program and exposure visit under Sanitation Capacity Building Program.

The session was hosted by Mr. Dhawal Patil, Sr. Resource Person. After introduction, Mr. Dhawal Patil briefed about the overall agenda of the training and exposure visit and provided the information of the training material and ground rules set for the training.

Presentation Session

Presentation 1: Towards ODF cities and beyond

Mr. Patil presented the first module Towards ODF cities and beyond. The key objective of this presentation was to provide an overview of the current sanitation facts of India. It also focused on the current challenges in sanitation sector. The session covered the following components:

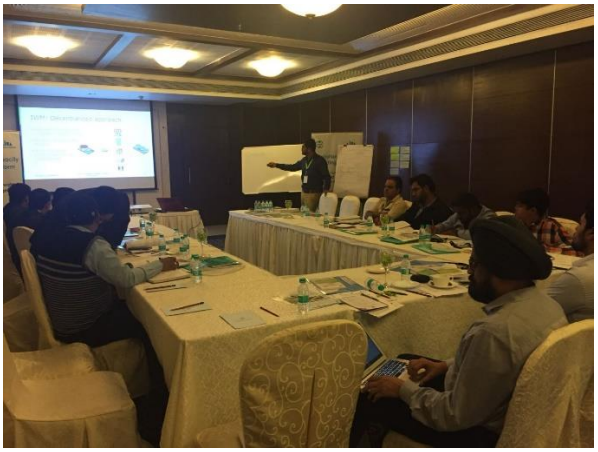
- Sanitation facts – India
- National Programs and Policies
- What is Integrated Wastewater and Septage Management (IWSM)?

- Need and Challenges in Sanitation Sector


Presentation 2: Sustainable Sanitation and Water Management

The second session was started with the presentation on Sustainable Sanitation and Water Management. The key objective of this presentation was to provide an overview of concept of sustainable sanitation and its management. It also focused on the ecological sanitation and closing the loop. The session was facilitated by Mr. Dhawal Patil, Sr. Resource Person covering the following components:

- Waste Products – black water, grey water, excreta, faecal sludge, domestic wastewater and stormwater
- Parameters for characterizing the wastewater – solids, organic constituents, nutrients, pathogens and other parameters
- Understand your system
- Ecological Sanitation – hygienically safe, economical and closing the loop
- Resource Management – centralized and decentralized approaches
- Planning of sanitation systems
- Closing the loop – urban water cycle, urban nutrient cycle loop



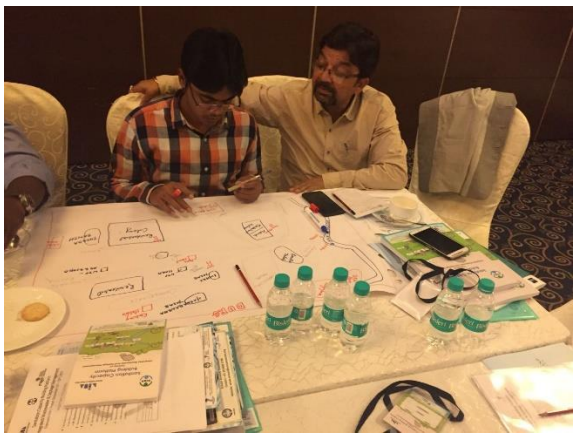
Presentation 3: Designing of Sanitation Systems

The session was started with the presentation on Designing of Sanitation Systems. The key objective of this presentation was to provide a brief overview of the sanitation systems and functional groups. It also focused on the decentralised systems and the systematic planning approach required in the designing. The session was facilitated by Mr. Dhawal Patil, Sr. Resource Person covering the following components:

- Designing of sanitation systems – functional groups, the ideal system, the appropriate system
- Decentralised system – shift in paradigm, limitations of centralised systems, features and constraints of decentralised systems
- Systematic planning – need of systematic planning, the best planning model, framework for strategic planning

Group Work: Understand your system

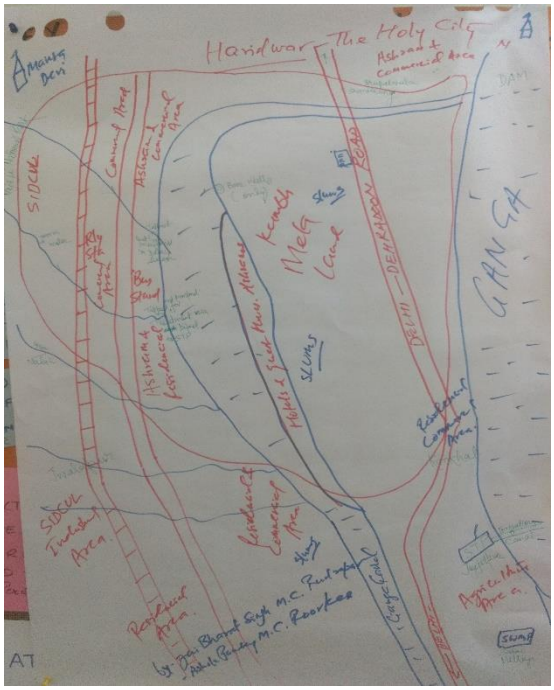
After the presentation, the group work was carried out with the participants on the understanding of the system. Mr. Dhawal Patil distributed the participants in four groups focusing the four different cities. The groups were distributed as group 1: Haridwar, group 2: Delhi, group 3: Durg, group 4: Bhilai, group 5: Didwana. The group activity helped the participants to define boundaries and identify water components of their locality.

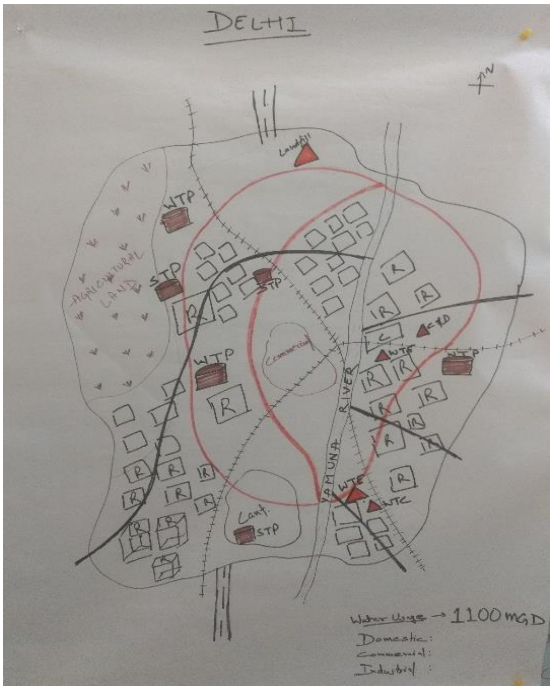


Mr. Dhawal Patil carried out the group activity and took an example of "The Case of Unsustainaville". Unsustainaville is in a plain, next to a river and some miles upstream from the sea. It has an industrial area to the North of the city, a central business district and some high-income areas. To the East, there are also some low-income areas that

are not well developed. To the South, on the outskirts of the city, are some agricultural areas.

This group work gave participants a comprehensive understanding of the local water and sanitation cycle by identifying the components (source, transport, use, etc.) and the existing links between them. In the discussion with the participants, each component is discussed with the participants and scenario of the cities were discussed with groups.





Presentation 4: Sanitation Systems and Technologies

This session was started with the presentation on Sanitation Systems and technologies. The key objective of this presentation was to provide a brief overview of the different sanitation systems and its objectives. It also focused on the emergency sanitation infrastructure. The session was facilitated by Mr. Dhawal Patil, Sr. Resource Person covering the following components:

- Sanitation and its objectives
- Functional Groups – User Interface, Collection and storage/treatment, conveyance, semi centralised treatment, use and/or disposal
- Sanitation systems
- Emergency sanitation infrastructure

Day 2, December 22nd, 2017

Site Visit: Peshwe Park Solid Waste Management Plant, Pune

In the first session of second day, visit to the study site Solid Waste Management Plant at Peshwe Park was carried out, which is of total 5TPD capacity. The plant Engineer explained the treatment process, treatment units, Operation and Maintenance (O&M) activities.

It is located near Sarasbaug at Swargate. The organic waste generated in the nearby hotels and restaurants is collected in the collection truck. Then it is transported to the same plant. Treatment units are such as follows,

1. Inlet dumping station
2. Segregation (manual)
3. Electronic Shredder
4. Primary Digester
5. Secondary Digester
6. Scrubber
7. Gas collection balloons
8. Electricity Generator set

Segregation process is carried out manually at this plant. After digestion the generated gas is passed through scrubber to dissolve harmful gasses like CO_2 and H_2S. Total 15 number of staff involved in the whole operation of the plant. The electricity generated from this plant is used for around 40 number of street lights which are there on nearby street.

The participants discussed about the functioning of the plant. After understanding each and every processes and units, participants asked many questions and doubts about the functioning and feasibility of the plant. Some participants compared the cost of operation and other O&M activities of this plant with few similar plants in Rajasthan.

Site Visit: Sewage Treatment Plant at Erandwane, Pune

In this session of second day, participants have visited the sewage treatment plant, Mhatre Bridge, Erandwane, of total 50 MLD capacity. The plant Engineer explained the treatment process, treatment units, Operation and Maintenance (O&M) activities step by step. This STP covers the areas of Erandwane from PMC. All the sewage generated from the residential and commercial buildings from these areas is conveyed to this STP by a closed sewer network. The plant is built on the bank of the river Mula. Treatment chain used to treat wastewater and sludge produced is as follows,

Wastewater treatment chain	**Sludge treatment chain**
Intake well	Thickener tank
Bar screen for solid waste removal	Aerobic digestor
Grit removal tank	Centrifuge dewatering unit
Primary clarifier	Disposal using heavy motorised vehicle.
Activated sludge process reactor (2 no.)	
Secondary clarifier	
Chlorine contact channel	
Disposal in nallah leading to Mula River.	

Operation of complete plant is carried out by automatic mode. PLC SCADA technology is used for the automation and each process operates on sensors. Total 40 number of staff is involved in the whole operation. The treated water from this STP

is discharged into the irrigation canals from which it is being used by farmers downward side of the Pune.

The participants got an opportunity to communicate about the function of the plant directly with the plant Engineer. After understanding each and every processes and units, participants asked many questions and doubts to the Engineer regarding the costing and area requirement. The participants discussed about the functioning and feasibility of the plant.

The site visit helped the participants to get deeper understanding and working of the Activated Sludge Process based Sewage Treatment Plant.

Visit to Pune Municipal Corporation

As per the request made by the participants, a one on one discussion was held with Deputy Commissioner, Mr. Suresh Jagtap at his chamber in the Pune Municipal Corporation premise.

A quick introduction of the SCBP program and the participants happened post which Mr. Jagtap explained the organizational & administrative structure of the PMC, city and its urban fabric along with overview of the sanitation systems starting from water, toilets (IHT, public toilets, community toilets), wastewater and solid waste.

There was intense discussion for solid waste management and involvements of non-governmental, non-profit companies to complete the sanitation service chain. The structure and contract with PMC and SWACHH was discussed in details and how the capacity building of the people working for SWACHH is carried out.

Upon request by the participants, Mr. Jagtap was kind enough to share the Rules and Regulations book for sanitation services which was published by PMC recently. It was recommended that the ULBs should take firm steps in order to create the law and policy for better management and sustainability of the projects.

Post this the participants from Uttarkhand asked questions pertaining to Swachh Survekshan and projects undertaken under Smart City Project. Mr. Jagtap explained about the innovative projects undertaken by the city for improving transport, solid waste management and improving public space and facilities. He also showed a model public toilet which has all state of the art facilities for the citizen. He said 9 such toilets will be constructed in Pune soon.

The meeting ended with a quick vote of thanks to Mr. Jagtap for taking out valuable time to have discussions with participants and give inputs for city management.

Site Visit: DTS & Constructed Wetland, College of Engineering Pune

In the first session on the last day, participants have visited the Decentralized Treatment System and Constructed Wetland Plant situated at College of Engineering Pune. Mr. Dhawal Patil explained the background of the system, treatment process of the system, treatment units, operation and maintenance (O&M) activities step by step to the participants.

This plant is located in the centre of the city area called Shivajinagar. The hostel campus of College of Engineering Pune has total residence capacity of 2000 students. They have new and old hostel blocks and in new hostel block segregation of black

and grey water has been installed, while in old hostel blocks segregation system is not installed.

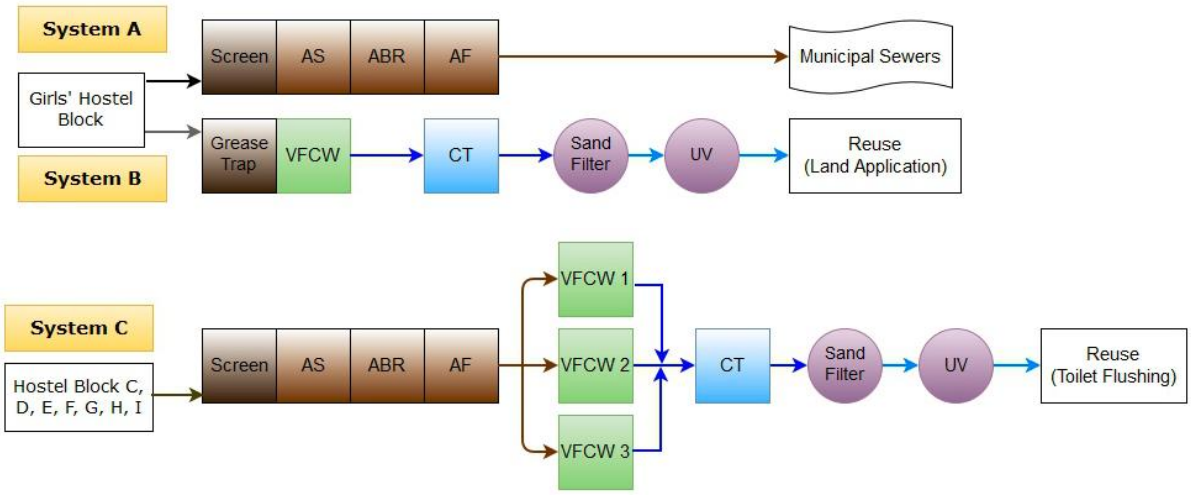


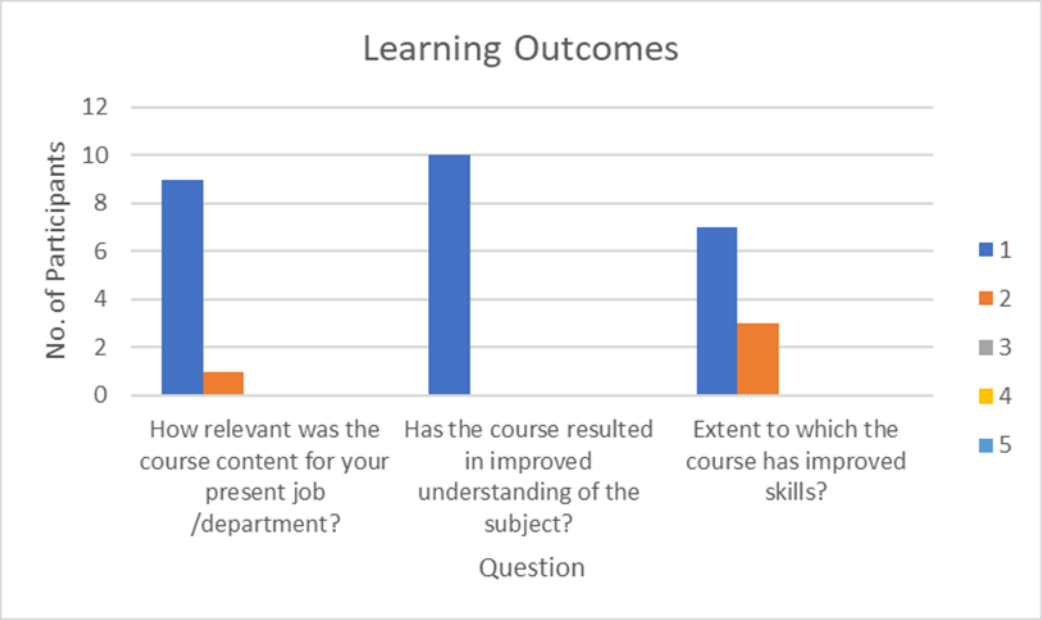
FIGURE 1: DTS AND CONSTRUCTED WETLAND

It is a decentralised treatment system and the treated water is reused in toilet flushing and gardening activity in the hostel campus. This technology is natural treatment technology with minimal operational cost. Requirement of electricity, skilled labours is very minimum.

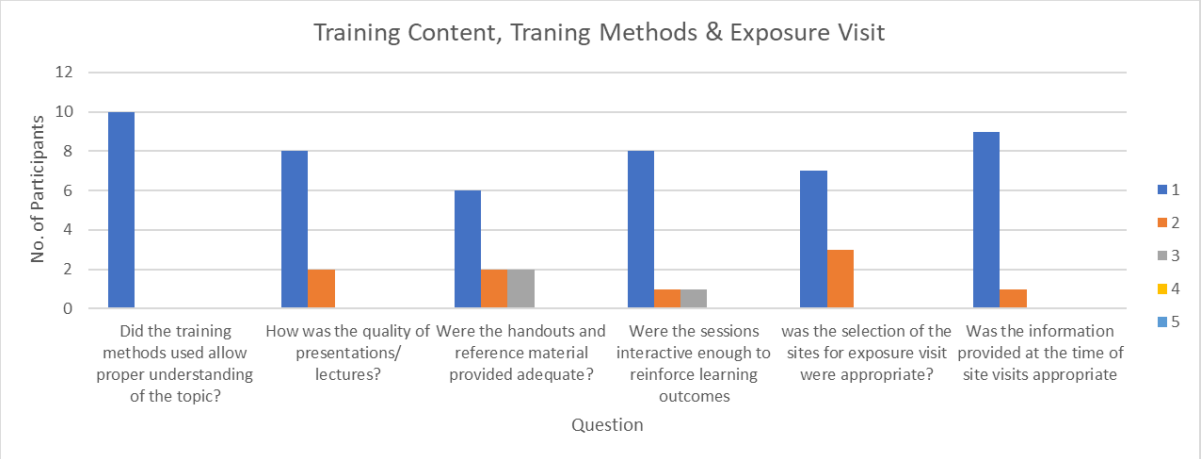
Participants got an opportunity to communicate about the functioning of the plant directly with the management. After understanding each and every processes and units, participants discussed about the cost of operation and other O&M activities of this plant. They found this system suitable for the bulk generators whoever can manage their wastewater at the source.

Feedback and Wrap-up Session

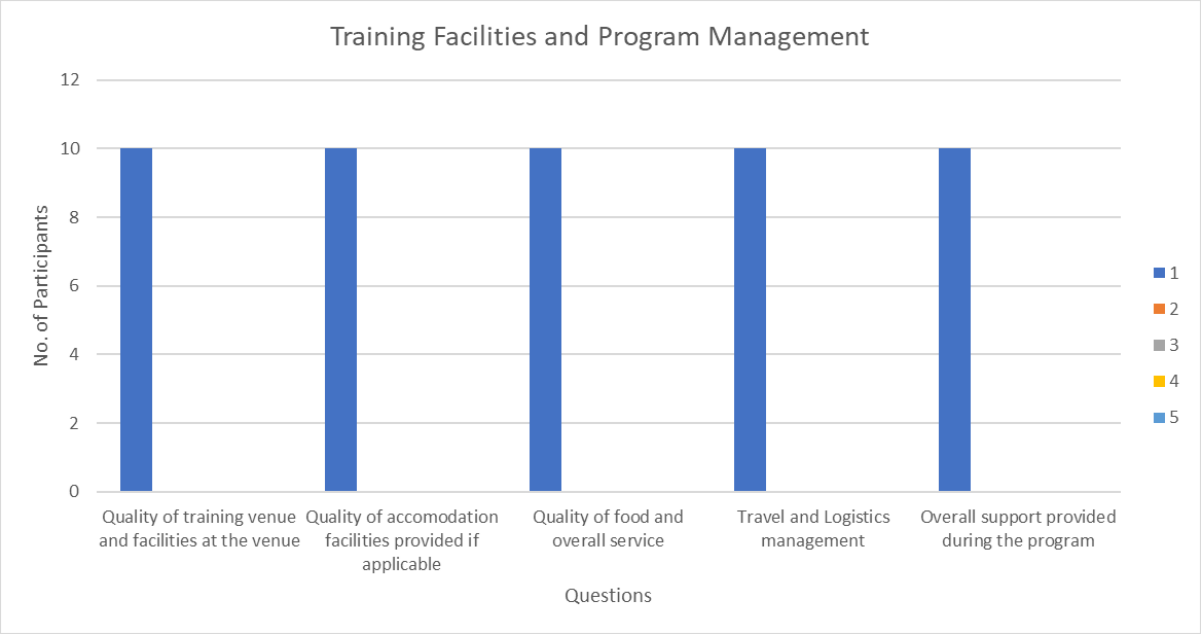
The participants were satisfied with the overall training and exposure visit and they found it to be very relevant to their day-to-day functions and responsibilities, as evident from the feedback conducted by the participants. They were observed to be motivated to go back with a good understanding of the Integrated Wastewater Management and concrete ideas for implementation in their respective cities. The participants were asked to evaluate the workshop on five parameters – content of the training, training methods, trainers, relevance of the training to their work and the venue. Followings graphs are showing the answers given by participants for the questionnaire.



Out of 10 participants 90% participants feel the content is relevant to their current work profile. 70% participants found the course has improved their skills sets.



All the participants were completely satisfied with the methods used for training and group work for communicating the topic. 80% of the participants felt that the quality of the presentations was up to the mark and sessions were interactive to reinforce the learning outcomes. This also facilitated inter state exchange of ideas and experiences. 60% of the participants were satisfied with the reference material given to during the training. However, there were no suggestions given for improvement during the verbal feedback session. Although 70% of the participants were satisfied with selection of sites for the exposure visit, 90% of the participants were satisfied with the explanation provided during the site visit.



All the participants were quite satisfied with the training facility and overall program management.

In the closing session, Mr. Dhawal Patil Sr. Resource Person, ESF thanked all the participants and the National Institute of Urban Affairs for their support on successfully organising the training cum exposure visit at Pune. The participants also thanked the organizers, NIUA for the very useful training. The participants were awarded certificates for their participation. Mr. Dhawal Patil, Sr. Resource Person felicitated the participants with Certificate of Participation. They thanked the participants for their active participation and making the training cum exposure visit a success.

ANNEXURES

Attendance Sheet

National Institute of Urban Affairs

Integrated Wastewater & Septage Management

Exposure Visit | Pune | December 21st – 23rd, 2017

ECOSAN SERVICES FOUNDATION

Sr No.	Name	Location	Signature		
			Dec 21st, 2017	Dec 22nd, 2017	Dec 23rd, 2017
1	Mr. Arbind Kumar Jha	Bihar			
2	Mr. Sushil KUMAR Mishra	Supaul			
3	Mr. Bipin Kumar	Bettiah			
4	Mr. Kuldeep Gupta	Bhilai			
5	Mr. Prakash Thawaney	Bhilai Charoda			
6	Mr. Piyush Rajput	Korba			
7	Mr. Ankur Agrawal	Durg			
8	Mr. Dilip Markam	Rajnandgaon			
9	Mr. Ashok Kumar Pandey	Roorkee			
10	Mr. Jay Bharat Singh	Rudrapur			

JAI

Attendance Sheet

National Institute of Urban Affairs

Integrated Wastewater & Septage Management

Exposure Visit | Pune | December 21st – 23rd, 2017

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Sr No.	Name	ULB Name	Signature		
			Dec 21st, 2017	Dec 22nd, 2017	Dec 23rd, 2017
11.	Dhawal Patil	ESF	Dpatil	Dpatil	Dpatil
12.	Mrunal Karve	ESF			

Attendance Sheet

Feedback Form

National Institute of Urban Affairs

Integrated Wastewater & Septage Management

Exposure Visit | December 21st – 23rd, 2017

ecosan SERVICES FOUNDATION

FEEDBACK FORM

General Information	
Name	Arbind Kumar Jha.
Designation	Joint Secretary, Urban Dev. Deptt. Patna (Bihar)
City	Patna
Contact No.	9431277900
Email Id	arbi.jha@gmail.com

Learning Outcomes (tick for the appropriate option)					
How relevant was the course content for your present job /department?	✓				
Has the course resulted in improved understanding of the subject?	✓				
Extent to which the course has improved skills?	✓				
Training Content, Training Methods, Exposure Visits (tick for the appropriate option)					
Did the training methods used allow proper understanding of the topic?	✓				
How was the quality of presentations/ lectures?	✓				
Were the handouts and reference material provided adequate?	✓				
Were the sessions interactive enough to reinforce learning outcomes	✓				
Was the selection of the sites for exposure visit appropriate?	✓				

Was the information provided at the time of site visits appropriate?	✓				
Training Facilities and Program Management (tick for the appropriate option)					
Quality of training venue and facilities at the venue Convenience of location	✓				
Quality of accommodation facilities provided, if applicable	✓				
Quality of food and overall service	✓				
Travel and logistics management	✓				
Overall support provided during the program	✓				
Any other qualitative feedback regarding the training facilities and management	Excellent.				