



Ministry of Urban Development,
Government of India, New Delhi

“Sustainable Environment Management”

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Supported under



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**Comprehensive Capacity Building Programme (CCBP)
Ministry of Urban Development
Government India**

Prepared by:

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Aims

The training aims to

- Promote environment sustainability in development planning and implementation in urban are.
- Raise participants Knowledge Skill and attitude on how solid waste management and liquid waste management plays a key role in the environment sustainability
- To motivate through sharing of knowledge, best practices /case study/field exposure Sensitize the participants to develop knowledge, skill and attitude to effective management of Solid Waste and Liquid waste.

Training objectives

The training is designed to achieve the objects.

At the end of the training trainee will be able to:

1. Describe the importance of effective waste management
2. Explain the innovation and technologies available in the market and suitable technology to their ULB's
3. Design the plan for waste management in their respective ULB's
4. Discuss the issues in waste management and legislative approaches to waste management
5. Explain the steps involved in field implementation of the Solid Waste Management and Liquid waste Management

Training Modules:

Module: 01: Urban Environment and Urbanization

Module: 02: Climate Change: Global perspective

Module: 03: Environmentally Sustainable Sanitation in India: NUSP

Module: 04: Urban Solid Waste Management

Module: 05: Solid Waste Management: Treatment, Resource Recovery and Safe Disposal

Module: 06: Technology and Management options for Septage Management

Module: 07: Field Visit

Module: 08: Waste to Energy Concepts.

Module: 09: Stakeholders involving in Protecting the Urban Environment

Methodology

Lecture cum discussion
Group Discussion and Activities
Field Visit
Case Studies
Film Shows

Participants

Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.

Duration

Total 3 days has been planned in which 2 1/2 days on classroom session and ½ (Half) day for field exposure

How to Use the Module

- This module is meant for use by the resource persons/Course Directors. Before starting the training programme they must thoroughly familiarise themselves with the module.
- The module contains details of a three days programme. Each session indicates the following sequence.

COMPONENT	DESCRIPTION
Content	Urban Environment and Urbanization
Background	<ul style="list-style-type: none"> • To explain the powerful and interdependent relationship between the concepts of sustainability, urbanization and services to citizens in ULBs • To gain a more detailed explaining of the ways in which urban life provide opportunities and challenges for addressing climate change, access to water/waste services and energy efficiency • To sensitize the government officials from departments related to water, sanitation and health on implications of climate change/global warming • To enhance the capabilities of participants in managing solid and liquid wastes, and who are planning to implement practices such as cleaner production, resource recovery and waste to energy approach • To provide an insight into the importance of alternative energy sources utilization • To gain knowledge about preparing risk mitigation plans and developing response action plans during disasters in urban areas
Target Groups / Intended Audience(S)	<ul style="list-style-type: none"> • Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • Highlight climate change aspects that need to be incorporated into government planning, design and implementation of various developmental programmes in ULBs • Explain the National Urban Sanitation Plan (NUSP) and preparation of City Sanitation Plan (CSP) • Graduate with the knowledge and expertise to reduce the ever-growing amount of waste that our homes and businesses generate, and effective methods to dispose of waste safely and economically • Suggest convergence of institutions and people participation in city sanitation • Explain the use of alternative energy sources to fulfill the demand of Energy and foresee the benefits of energy auditing • Explain Waste to Energy concepts, solar and wind power • Explain the occurrence of natural and man-made disasters and plan the mitigation measures to be taken up

Module Overview	<ul style="list-style-type: none"> • Urbanization: - An Overview • India in a Global Context • Urbanization in India trails global average • Status of Urban India • Increasing urbanization can propel India’s economic growth • Municipal Revenue Surplus not adequate for Large Capital Investments • The Growing Importance of Cities. • Trends in Aggregate Municipal Revenue and Expenditure: • Urbanization in States, Karnataka • The Challenges • Functional Domain of ULBs
Module Delivery Outline	<p>Urban Environment and Urbanization</p> <ul style="list-style-type: none"> • Introduction to Environment and Urbanization • Challenges of Urbanization and Current scenario of Urbanization in Karnataka • Environment Protection law and CPCB/KSPCB guidelines • Waste Generation and Urban life quality • Role of ULB’s in providing basic services to the citizens
Module Activities	<p>Resource Person encourages the participants to share their lifetime experience in urban environment and urbanization. The difficulties faced in pollution control and protecting the urban environment/ at field level. The innovative ideas to handle the problems. ULBs are committed to provide the healthy environment and this session helps them to explain the concept</p>
Method	<p>Lecture, Participatory Discussion: Case Study</p>
Supporting Materials	<p>As prepared / developed by the institute</p>
Module Feedback	<ul style="list-style-type: none"> • Participants will be able to explain the critical environmental impact and various developmental projects taken up by ULBs and the need to compliance to Environmental Laws. • Efforts for scientific management of waste and safe disposal after resource recovery. • ULB’s commitment to provide citizen better public services and protecting environment. • GOI and GoK funds for the programme implementation

COMPONENT	DESCRIPTION
Content	Climate Change: Global perspective
Background	<ul style="list-style-type: none"> • Introduction • Global Climate Models • National Action Plan on Climate Change (NAPCC) • Principles of NAPCC • Approach • Eight National Missions • Main strengths, challenges and weaknesses of the missions • State Action Plan on Climate Change (NAPCC) • Impacts on surface water, runoff and river discharge • Impacts on groundwater resources • Impacts on water availability
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • Highlight climate change aspects that need to be incorporated into Government's planning, design and implementation of developmental programmes • Identify causes and effects of Climate Change • Identify research gaps that require attention of researchers and decision makers
Module Overview	<ul style="list-style-type: none"> • Climate Change - Global context • Explaining soil, water and life forms relationship and interdependency • Impact of climate change on domestic water supply, water quality and sanitation
Module Delivery Outline	Workbook, Case study, Discussion and presentation
Module Activities	RP will give an overview on the changing world view on Climate Change and Global Warming- its causes and effects
Method	White Board/LCD Projector/PPT/ Handouts, Short films
Supporting Materials	<ul style="list-style-type: none"> • Participants will explain the enhanced capacity of stakeholders on implications of climate change • Participants will comprehend the enhanced level of preparedness of stakeholders to incorporate climate change aspects in planning, design and implementation developmental of programmes related to water and sanitation • Participants will learn about the clear and concise strategy to mainstream climate change into strategic planning process related to the water and sanitation

COMPONENT	DESCRIPTION
Content	Environmentally Sustainable Sanitation in India: NUSP
Background	<p>A. Awareness generation and behaviour change</p> <ol style="list-style-type: none"> i. Generating awareness about sanitation and its linkages with public and environmental health amongst communities and institutions; ii. Promoting mechanisms to bring about and sustain behavioural changes aimed at adoption of healthy sanitation practices. <p>B. Open defecation free cities Achieving open defecation free cities</p> <ol style="list-style-type: none"> i. Promoting access to households with safe sanitation facilities (including proper disposal arrangements); ii. Promoting community-planned and managed toilets wherever necessary, for groups of households who have constraints of space, tenure or economic constraints in gaining access to individual facilities; iii. Adequate availability and 100% upkeep and management of public sanitation facilities in all urban areas, to rid them of open defecation and environmental hazards. <p>C. Integrated city-wide sanitation Re-orienting institutions and mainstreaming sanitation</p> <ol style="list-style-type: none"> i. Mainstream thinking, planning and implementing measures related to sanitation in all sectors and departmental domains as a cross-cutting issue, especially in all urban management endeavours; ii. Strengthening national, state, city and local institutions (public, private and community) to accord priority to sanitation provision, including planning, implementation and O&M management; iii. Extending access to proper sanitation facilities for poor communities and other un-served settlements. <ul style="list-style-type: none"> • Sanitary and safe disposal <ol style="list-style-type: none"> i. Promoting proper functioning of network-based sewerage systems and ensuring connections of households to them wherever possible; ii. Promoting recycle and reuse of treated wastewater for non-potable applications wherever possible; iii. Promoting proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.); iv. Ensuring that all the human wastes are collected safely conveyed and disposed of after treatment so as not to cause any hazard to public health or the environment. • Proper operation and maintenance of all sanitary installations <ol style="list-style-type: none"> i. Promoting proper usage, regular upkeep and maintenance of household, community and public sanitation facilities; <p>Strengthening ULBs to provide or cause to provide, sustainable sanitation services delivery</p>
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.

Learning Objectives	<ul style="list-style-type: none"> • Explain the concept of CSP and activities involved in its preparation • Describe the key concepts within NUSP • Design a tentative CSP for a town (with available information)
Module Overview	<ul style="list-style-type: none"> • National Urban Sanitation Plan (NUSP) and preparation of City Sanitation Plan (CSP) • Salient features of NUSP • Preparation of CSP • Sharing of one CSP – Shimla, Tirupathi, Davanagere, etc
Module Delivery Outline	Workbook, Case study, Discussion and presentation
Module Activities	Resource person explains the NUSP and its importance, the concept of CSP and activities involved. He motivates trainees to share their experience and he presents some case studies of success effort in Planning. Assign group work to design CSP for their town in group.
Supporting Materials	<ul style="list-style-type: none"> • Introduction to National Urban Sanitation Policy and City Sanitation Plans • Why management of on-site sanitation needs attention? • The National Urban Sanitation Policy (NUSP): Policy Goals • Awareness generation and behaviour change • Open defecation free cities • Achieving open defecation free cities • Integrated city-wide sanitation • Re-orienting institutions and mainstreaming sanitation • Sanitary and safe disposal • Proper operation and maintenance of all sanitary installations
Module Feedback	<ul style="list-style-type: none"> • Trainees will realize the importance of inclusive development of the town to address issues and safely disposing waste. The importance of complete City Plan for the city to have a healthy lifestyle. • Expected to communicate to the respective heads of the ULBs to think on CSP for their town/cities

COMPONENT	DESCRIPTION
Content	Urban Solid Waste Management
Background	<ul style="list-style-type: none"> • Municipal solid waste management (MSWM) is one of the major environmental problems of Indian cities. Improper management of municipal solid waste (MSW) causes hazards to inhabitants. • Various studies reveal that about 90% of MSW is disposed of unscientifically in open dumps and landfills, creating problems to public health and the environment. • In the present scenario, an attempt has been made to provide a comprehensive review of the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India. • Various adopted treatment technologies for MSW are critically reviewed, along with their advantages and limitations.
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • Explain the scenario of SWM in the State and its initiatives • List the use of GIS tools in SWM • Describe the challenges and solution in SWM implementation • List the various approaches/technologies for Resource Recovery from Urban Waste
Module Overview	<ul style="list-style-type: none"> • Current scenario of SWM and LWM • Challenges & reasons for failure – Political, Economical, Social and technological analysis framework • Reforms - Usage of GIS maps for planning, Use of e-technologies like GPS etc. for effective monitoring • Role and responsibility of ULB's and Citizens State/ULB commitment – SLB
Module Delivery Outline	<ul style="list-style-type: none"> • Reduce, Reuse, Recycle, Waste reduction and reuse , • Waste Collection, Treatment and Disposal, Thermal treatment
Module Activities	<p>Resource Person encourages the participants to share their lifetime experience in waste management. The difficulties at field level and the way they address the issue. The innovative ideas to handle the problems. The solution may be replicable in the other towns and cities with small modification in waste management. Best and worst practices in SWM management</p> <p>ULBs commitment to waste management and the role of the health inspectors and environmental engineers.</p>
Supporting Materials	PPT Presentations, Workbook, Case study, Discussion
Module Feedback	<p>Trainees will realize the importance of inclusive development of the town to address issues and safely disposing waste. The importance of complete SWM in the city for scientific disposal for safe Sanitations.</p> <p>Expected to communicate to the respective heads of the ULBs to think on SWM for their town/cities</p>

COMPONENT	DESCRIPTION
Content	Solid Waste Management: Treatment, Resource Recovery and Safe Disposal
Background	The evolution of solid waste management; legislative trends and impacts; sources, types, composition and properties of municipal solid wastes; sources, types and properties of hazardous wastes found in municipal solid waste; engineering principles of solid waste generation, collection, separation, storage, transport, processing and transformation both at the source and off-site; disposal of solid wastes and residual matter (landfills, landfill leachates and landfill gases); separation, transformation and recycling of waste materials, including biological conversion technologies; closure, restoration and rehabilitation of landfills; and solid waste management and planning issues
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • To minimize the rate of waste generation through education and source reduction. • Explain the steps, difficulties and the solutions in SWM • Describe the reforms and new technologies to enhance the capacities of officials of SWM • Describe the importance of scientific landfill site, engineering landfill • Exchange the ideas on success and failure stories of safe disposal of waste and Resource Recovery; • To encourage and facilitate the recovery, reuse and recycling of material within the waste stream; • To maintain, at a minimum, the MRA recycling mandate of 20%; • To decrease the volume of residual waste, which must be managed; • To efficiently manage all waste generated in Carroll County from the point of generation through ultimate disposal; • To provide for adequate facilities and programs to achieve these goals, for a ten-year planning period and beyond; • To operate a transfer capability in a manner that optimizes the delivery of Carroll’s MSW to other final disposal sites; and • To implement a County policy that considers land filling a “last resort” in the waste management hierarchy.
Module Overview	<ul style="list-style-type: none"> • Types of waste and recovery of resources. • Best practices on segregation, collection and disposal -Zero waste management • Scientific Landfill development and management – infrastructure requirement, green belt, etc. • Composting Techniques • Engineered landfill/dumping of waste and its management • Success and failure stories along with its economics –national and global level

Module Outline	Delivery	Resource Person motivate participants to exchanges their experience and ideas on waste management. Few best practices with in the class rooms will be explained to motivate others. Group discussions create an opportunity to identify the suitable solution to their towns and cities. Participants share their experience in landfill. Technical session on designing of engineering landfill and scientific landfill will be handled by Resource Person The group activity motivate the participants to design a plan for their landfill.
Module Activities		Resource person explains the Landfill site activities and its importance, the concept of SWM and activities involved. He motivates trainees to share their experience and he presents some case studies of success effort in Planning. Assign group work to design SWM for their town in group.
Supporting Materials		PPT Presentations, Workbook, Case study, Discussion
Module Feedback		Trainees will realize the importance of inclusive development of the town to address issues and safely disposing waste. The importance of complete Land fill site in out of the city for scientific disposal for safe Sanitations.Expected to communicate to the respective heads of the ULBs to think on SWM for their town/cities

COMPONENT	DESCRIPTION
Content	Technology and Management options for Septage Management
Background	Background Technological Options for Septage Management <ul style="list-style-type: none"> • Current Practices • Stages of Septage Management • Septage Treatment Options • Sludge Disposal and Reuse • Liquid Effluent Disposal/Reuse • Policy Framework for Septage Management
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • Explain the mandate of environmental laws related to Sewage and Septage handling and disposal • List and validate design data to be used on the design of Sewage and Septage • Describe treatment process flow sheet by combining unit operations and processes of wastewater engineering • List the basic tools on the operation and management of Sewage and Septage Treatment plant
Module Overview	<ul style="list-style-type: none"> • Environmental laws related to Sewage and Septage Handling and Disposal • Update on the Clean Water Act and the proposed General Effluent Standards • Basic Design Considerations for Sewage and Septage Treatment Plant • Explaining the Unit Operation and Unit Process
Module Delivery Outline	RP will focus on the composition, treatment and safe disposal of waste keeping in view the compliance to local Environmental Laws
Module Activities	The Resource Person will identify suitable projects and arrange the logistics for the field visit. The Resource Person /Course Co-ordinator will discuss with concerned project authority about the profile of project to be visited by the participants well in advance. Necessary demonstration, professional interaction by the concerned Officers at the project site and Project Office shall be ensured. The participants will be given a checklist for structured interaction in addition overall picture of the project. The Participants will prepare and make a presentation of the field visit in the following session.
Supporting Materials	PPT Presentations, Workbook, Case study, Discussion
Module Feedback	<ul style="list-style-type: none"> • Increased awareness on need for treatment, Resource Recovery and safe disposal of waste and Compliance to Environmental Laws to protect local environment for a healthy and livable city • Explain the biological treatment processes and prevention of pollution

COMPONENT	DESCRIPTION
Content	Field Visit
Background	<ul style="list-style-type: none"> • The stages in, Water management, SWM & Land fill site management. • Explain the importance of energy conservation • List the various methodology adopted in treating fresh water, waste water and solid waste in the site. • Explain the importance of Solid and liquid waste management • Describe the importance on selection of the suitable technology to waste management.
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<p>The participants will be able to;</p> <ul style="list-style-type: none"> • Visit the projects • Observe the merits and demerits of the project • Prepare report of the field visit
Module Overview	Field Visit, Demonstration, Interaction, Presentation and Discussion
Module Delivery Outline	<ul style="list-style-type: none"> • Introduction to Land fill site in Mangalore city • Why management of Land fill site needed in the Cities? • Awareness of Land fill site for ULBs. • Achieving open Solid waste free cities • Integrated city-wide sanitation
Module Activities	<p>The Resource Person will identify suitable projects and arrange the logistics for the field visit. The Resource Person /Course Co-ordinator will discuss with concerned project authority about the profile of project to be visited by the participants well in advance. Necessary demonstration, professional interaction by the concerned Officers at the project site and Project Office shall be ensured. The participants will be a given a checklist for structured interaction in addition overall picture of the project. The Participants will prepare and make a presentation of the field visit in the following session.</p>
Supporting Materials	Checklist for field visit, Basic information on sites and PPT Presentations, Workbook, Case study, Discussion
Module Feedback	Exposure visit provide them the opportunities to look around the various methods and technologies in water, Energy and waste management. Trainees select the suitable method and technology to address their solid waste management issues in a short period.

COMPONENT	DESCRIPTION
Content	Waste to Energy Concepts
Background	<ul style="list-style-type: none"> • Waste-to-energy or energy-from-waste is the process of generating energy in the form of electricity and/or heat from the incineration of waste. Waste to Energy is a form of energy recovery. • Most Waste to Energy processes produce electricity and/or heat directly through combustion, or produce combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuels.
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<ul style="list-style-type: none"> • Explain the importance of Energy Security and options • List the various alternate energy systems that can be adopted in ULBs • Explain the importance of alternative energy sources utilization
Module Overview	Waste-to-energy technologies that produce fuels are referred to as waste-to-fuel technologies. Advanced waste-to-energy technologies can be used to produce biogas (methane and carbon dioxide), singes (hydrogen and carbon monoxide), liquid bio-fuels (ethanol and biodiesel), or pure hydrogen; these fuels can then be converted into electricity. The primary categories of technology used for waste-to-energy conversion are physical methods, thermal methods, and biological methods.
Module Delivery Outline	Discussion, Lecture, Individual Action Plan and Group Discussion, Case study
Module Activities	The Resource Person will identify suitable projects and arrange the logistics for the field visit. The Resource Person /Course Co-ordinator will discuss with concerned project authority about the profile of project to be visited by the participants well in advance. Necessary demonstration, professional interaction by the concerned Officers at the project site and Project Office shall be ensured. The participants will be a given a checklist for structured interaction in addition overall picture of the project. The Participants will prepare and make a presentation of the field visit in the following session.
Supporting Materials	PPT Presentations, Workbook, Case study, Discussion
Module Feedback	<ul style="list-style-type: none"> • Participants' knowledge on energy efficiency will increase • Participants will think on using alternative energy sources to fulfil their demand of Energy • Participants can implement waste to energy concepts

COMPONENT	DESCRIPTION
Content	Stakeholders involving in Protecting the Urban Environment
Background	<ul style="list-style-type: none"> • Operation and maintenance activities rarely encompass only technical issues. Managerial, social, financial, and institutional issues also play roles in advancing infrastructure sustainability. • There are a myriad of ways to implement effective operation and maintenance of rural water supply and sanitation services in developing countries. • Community participation is one way to achieve this, committees of users (ideally gender balanced) can organize responsibility for the operation and maintenance of a system.
Target Groups / Intended Audience(S)	Environmental Engineers, AEE and Health officers/Inspectors of Urban Local Body will be the participants of the training.
Learning Objectives	<p>Participants will be able to;</p> <ul style="list-style-type: none"> • Explain the importance of IEC in Sustainable Urban Environment • Explain the role and responsibility of the stakeholders • List the various suitable IECs for Water and Sustainable Urban Environment
Module Overview	Defining community participation, Different forms of community involvement, Stages where 'community participation' can occur in the project cycle, Needs assessing, Mobilizing, Training, Implementing, Monitoring and evaluation, Disincentives for community participation
Module Delivery Outline	Discussion, Lecture, Individual Action Plan and Group Discussion, Case study
Module Activities	<ul style="list-style-type: none"> • Different forms of community involvement • The role of NGOs or CBOs in urban services • Incentives for community participation • Pre-conditions for successful community participation in urban services
Supporting Materials	PPT Presentations, Workbook, Case study, Discussion
Module Feedback	<ul style="list-style-type: none"> • Participants will learn that IEC is an important component in Sustainable Urban Environment. This IEC is a continuous process to get the best result. • Participants will realize the importance of IEC in Sustainable Urban Environment and introduce effective implementation of IEC in their working place.

Training Summary:

After the training the participants are expected to implement the learning in the classroom to field (Lab to land). The innovations, new technologies and the different methods presented by the resource persons as well as by the co-participants, help them to make right choice, in selecting the suitable methods and machine as their requirement.

Mutual learning helps for the better explaining of the concepts. Selecting the right technology based on the field demand reduce the burden on the officials and officers working in water management, Energy efficiency and in Waste management. This will lead to good governance and healthy environment to the citizens.

For information or queries, please contact,

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Or

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