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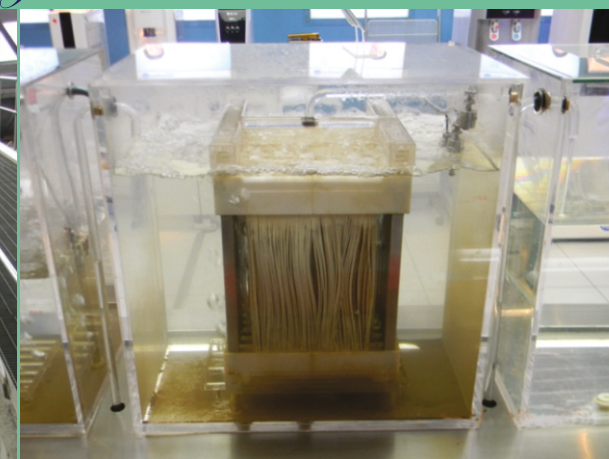


National Mission on Sustainable Habitat :

Adaptation and Mitigation Measures

In the field of

Water Supply & Sanitation



Central Public Health and Environmental Engineering Organization
(CPHEEO)

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Dr. Sudhir Krishna
Secretary
Ministry of Urban Development
Government of India



Foreword

Recent observations of Intergovernmental Panel on Climate Change (IPCC), a UN body, indicate that the earth's climate is rapidly changing. Surface air-temperatures for the period 1901-2005 indicate a significant warming of 0.5°C for 100 years. Green house gases (GHG) are responsible for global warming and are characterized by their Global Warming Potential relative to global warming resulting from Carbon Di-oxide (CO₂), the most ubiquitous greenhouse gas.

The threat of climate change emanates from the accumulated greenhouse (GHG) gases in the atmosphere, generated through long-term and intensive industrial growth and high consumption lifestyles in developed countries especially because of high level of urbanization.

India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change and is engaged with the international community through the United Nations Framework Convention on Climate Change (UNFCCC).

India also needed a national strategy to adapt to climate change while ensuring ecologically sustainable development. In this regard, the National Action Plan on Climate Change (NAPCC) was released by Hon'ble Prime Minister in 2008 having eight "National Missions" to address this need and to identify measures that promote India's development objectives, while also yielding co-benefits for addressing climate change viz. adaptation and mitigation effectively. National Mission on Sustainable Habitat, one of the eight National Missions, is entrusted to Ministry of Urban Development for implementation.

Ministry of Urban Development through its various programmes is striving hard to achieve developmental objectives of urban areas in harmony with environment. Central Public Health & Environmental Engineering Organization (CPHEEO), the Technical Wing of the Ministry, has estimated total GHG emission reduction capacity per annum at 2.14 billion tCO₂e due to various projects funded under its programmes in the field of water supply and sanitation. It has also developed sustainable habitat standards in the field of water supply and sewerage, solid waste and storm water drainage and is included in this report for adoption by all States/Local Bodies. The other related important activities in the field of Public Health Engineering to help align environmental concerns in developmental activities will also prove to be very helpful to users.

I hope that all States and Local Bodies would take necessary action on their part to use the information included in this booklet to suitably integrate in developmental activities to mitigate environmental degradation and help achieve the objective of sustainable urban India.

Sudhir Krishna

Neeraj Mandloi
Joint Secretary
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Preface

The National Mission on Sustainable Habitat (NMSH) is one of the eight National Missions under the National Action Plan on Climate Change (NAPCC) released by Hon'ble Prime Minister in 2008 to address the issues arising out of climate change viz. adaptation and mitigation.

The Central Public Health & Environmental Engineering Organization (CPHEEO), Technical Wing of Ministry, has brought out sustainable habitat standards in the field of water supply and sewerage, solid waste and storm water drainage in this report for integration of the same in the prevailing acts, rules/regulations governing developmental activities, at State level, by all States/Local Bodies. Efforts have been made to compile and bring out in this report, the other related important activities in the field of Public Health Engineering to help States/ULBs to align the environmental concerns in developmental activities for achieving the targets envisaged under NMSH. The glimpse of various activities undertaken by Ministry through its programmes/manuals/advisories/awareness creation materials included in this report will also be helpful in guiding States/ULBs in achieving the objective of sustainable habitat.

The City Government/ State Government may like to review the existing acts/rules/regulations prevailing in the States and suitably integrate the standards leading to its incorporation in various developmental activities in the State to ensure that all future developments and retrofitting works are in conformity with sustainable habitat.

NeerajMandloi

Chapter - 1

Background

1.1 National Action Plan on Climate Change (NAPCC)

India's first National Action Plan on Climate Change (NAPCC) was released on June 30, 2008 by the Prime Minister outlining existing and future policies and programs addressing climate change mitigation and adaptation. The plan identifies eight core "National Missions" running through 2017 and directs Ministries to submit detailed implementation plans to the Prime Minister's Council on Climate Change by December 2008.

Emphasizing the overriding priority of maintaining high economic growth rates to raise living standards, the plan "identifies measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively." It says these national measures would be more successful with assistance from developed countries, and pledges that India's per capita greenhouse gas (GHG) emissions "will at no point exceed that of developed countries even as we pursue our development objectives."

1.2 Eight National Missions

- (i) **National Solar Mission:** The NAPCC aims to promote the development and use of solar energy for power generation and other uses with the ultimate objective of making solar competitive with fossil-based energy options. The plan includes:
 - Specific goals for increasing use of solar thermal technologies in urban areas, industry, and commercial establishments;
 - A goal of increasing production of photovoltaic to 1000 MW/year; and
 - A goal of deploying at least 1000 MW of solar thermal power generation. Other objectives include the establishment of a solar research center, increased international collaboration on technology development, strengthening of domestic manufacturing capacity, and increased government funding and international support.

- (ii) **National Mission for Enhanced Energy Efficiency:** Current initiatives are expected to yield savings of 10,000 MW by 2012. Building on the Energy Conservation Act, 2001, the plan recommends:
- Mandating specific energy consumption decreases in large energy-consuming industries, with a system for companies to trade energy-savings certificates;
 - Energy incentives, including reduced taxes on energy-efficient appliances; and
 - Financing for public-private partnerships to reduce energy consumption through demand-side management programs in the municipal, buildings and agricultural sectors.
- (iii) **National Mission on Sustainable Habitat:** To promote energy efficiency as a core component of urban planning, the plan calls for:
- Extending the existing Energy Conservation Building Code;
 - A greater emphasis on urban waste management and recycling, including power production from waste;
 - Strengthening the enforcement of automotive fuel economy standards and using pricing measures to encourage the purchase of efficient vehicles; and
 - Incentives for the use of public transportation.
- (iv) **National Water Mission:** With water scarcity projected to worsen as a result of climate change, the plan sets a goal of a 20% improvement in water use efficiency through pricing and other measures.
- (v) **National Mission for Sustaining the Himalayan Ecosystem:** The plan aims to conserve biodiversity, forest cover, and other ecological values in the Himalayan region, where glaciers that are a major source of India's water supply are projected to recede as a result of global warming.
- (vi) **National Mission for a "Green India":** Goals include the afforestation of 6 million hectares of degraded forest lands and expanding forest cover from 23% to 33% of India's territory.
- (vii) **National Mission for Sustainable Agriculture:** The plan aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices.
- (viii) **National Mission on Strategic Knowledge for Climate Change:** To gain a better understanding of climate science, impacts and challenges, the plan envisions a new Climate Science Research Fund, improved climate modelling, and increased international collaboration. It also encourage private sector initiatives to develop adaptation and mitigation technologies through venture capital funds.

1.3 Implementation

Ministries with lead responsibility for each of the missions are directed to develop objectives, implementation strategies, timelines, and monitoring and evaluation criteria, to be submitted to the Prime Minister's Council on Climate Change. The Council will also be responsible for periodically reviewing and reporting on each mission's progress. To be able to quantify progress, appropriate indicators and methodologies will be developed to assess both avoided emissions and adaptation benefits.

1.4 National Mission on Sustainable Habitat (NMSH)

The National Mission on Sustainable Habitat (NMSH) is one of the eight National Missions under the National Action Plan on Climate Change. The Mission seeks to promote sustainability of habitats through improvements in energy efficiency in buildings, urban planning, improved management of solid and liquid waste including recycling and power generation, modal shift towards public transport and conservation. It also seeks to improve ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management and measures for improving advance warning systems for extreme weather events. The Mission is to be implemented through appropriate changes in the legal and regulatory framework, viz. Building Byelaws, Development Control and Regulation etc.; mainstreaming of climate change and sustainable development concerns in city planning through City Development Plans including those related to adaptation, promotion of modal shift in public transport through Comprehensive Mobility Plans, capacity building and outreach; and implementation of pilot projects.

The NMSH document has been formulated in consultation with the following agencies:-

- Bureau of Energy Efficiency (BEE)
- Ministry of Water Resources (MoWR)
- Ministry of New & Renewable Energy (MNRE)
- Department of Drinking Water Supply (DDWS)
- Ministry of Earth Sciences (MoES)
- Central Public Works Department (CPWD)
- National Institute of Urban Affairs (NIUA)
- National Building Construction Corporation (NBCC)
- Central Public Health & Environmental Engineering Organization (CPHEEO)
- Town & Country Planning Organization (TCPO)
- Institute of Urban Transport (IUT)
- Indian Institute of Technology (IIT), Roorkee
- Indian Institute of Technology (IIT), Chennai
- Indian Institute of Technology (IIT), Guwahati
- Integrated Research and Action for Development (IRADE)
- Indian Green Building Council (IGBC)

- Development Alternatives (DA)
- Centre for Science and Environment (CSE)
- Administrative Staff College of India (ASCI)
- The Energy & Research Institute (TERI)

The Mission document was approved by the Prime Minister's Council on Climate Change on 18th of June, 2010 and is uploaded on Ministry's website www.moud.gov.in. The Mission is to be implemented by the Ministry of Urban Development.

Objectives:

The NMSH seeks to promote sustainability of habitats through improvements in energy efficiency in buildings, urban planning, improved management of solid and liquid waste including recycling and power generation, modal shift towards public transport and conservation. It also seeks to improve ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management and measures for improving advance warning systems for extreme weather events.

1.5 Key deliverables of Mission

The first step towards implementation of the Mission is development of sustainable habitat standards which includes standards aimed at increasing energy efficiency in the residential and commercial sectors, urban transport, water supply and sewerage, urban planning and municipal waste. Adoption of benchmarks related to water supply, solid waste management, sewerage and storm water drainage is promoted as integral component of sustainable habitat standards as it provides useful framework for addressing issues relating to both adaptation and mitigation apart from performance improvements in these sectors. The sustainable habitat standards integrate standards related to energy performance of buildings, structural safety (against extreme events), energy efficient constructions, harmonizing of ECBC norms with NBC and EIA norms, mandatory rain water harvesting, integration of economic, transport, environment and risk planning with overall spatial and urban planning as well as regulations to discourage personal modes of transport and fuel efficiency standards. These standards to be subsequently get integrated with the Building Byelaws, Development Control and Regulations and Motor Vehicle Act etc. to ensure that future developments are aligned in accordance with concerns related to climate change and harness win-win opportunities towards overall sustainable development. The adoption of these standards will be incentivized through existing schemes like the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and other schemes of Government of India.

Comprehensive and holistic urban planning through City Development Plans that mainstream sustainable habitat standards is a key component of implementation strategy of the Mission.

The City Development Plans to cater to the requirements of both adaptation and mitigation and will include activities related to reducing vulnerabilities of communities against inadequate level of municipal services pertaining to water supply, waste water management, solid waste management, apart from integrated urban planning. Preparation of City Development Plans will be supported under JNNURM funds.

A set of complimentary actions comprising pilot projects related to green buildings, energy efficient construction material and technologies, recycle and reuse of solid and liquid waste, decentralized waste water management, use of low water technology, separation of grey water and black water, ecological sanitation, outreach activities aimed at raising awareness about economic and environmental benefits of energy efficiency and conservation, National network of key institutions working on issues relevant to the Mission, facilitating research and developmental activities exploring technological options for higher efficiency and lower cost green products, creation of dedicated website for wider dissemination of relevant information, institution of awards for high performance buildings and systems and financial incentives for energy efficient constructions.

The lack of capacity for efficient urban planning has been taken into account while developing the Mission strategy and constitutes an important element of overall implementation framework. The capacity building measures will cater to needs related to increasing energy efficiency in residential and commercial sectors, urban transport, waste water management, solid waste management and adaptation as well as those related to development of projects related to clean development mechanism.

The key deliverables of the Mission thus include the following:-

- (a) development of sustainable habitat standards that lead to robust development strategies while simultaneously address climate change.
- (b) preparation of city development plans that comprehensively address adaptation and mitigation concerns.
- (c) complementary actions.
- (d) capacity building for undertaking activities relevant to the Mission.

Chapter-2

Achievements

2.1 NMSH Standards

Three sub-committees were set up with participation of expert organisations to develop National Sustainable Habitat Standards in the areas of Water Supply and Sanitation, Solid Waste Management and Storm Water Drainage. Reports of the sub-committees were submitted and the same were circulated to State Governments, Expert Organisations and other Ministries of Govt. of India for information and incorporation of the standards in the relevant Bye-laws. A National Consultation Workshop was held in New Delhi to finalise the standards. The proceedings of the Workshop were circulated to all the States/UTs.

2.1.1 Urban Water Supply and Sewerage

In view of the present status of service delivery in urban water supply & sewerage and the wide gaps therein, it is clear that the availability of water will be severely strained due to increased urbanization compounded by polluting potential of untreated sewage. Hence, in order to promote public health and economic development, the water & sewerage services need to be made universally accessible and operationally sustainable.

The challenges in the water supply and sanitation sector summarised in the XI FYP document are as follows are still valid:

Water Supply

- (a) Sustainability & Equity
- (b) Demand & Supply Management
- (c) Financing and institutional issues
- (d) Tariff & O&M

Urban Sanitation (Sewerage)

- (a) Expansion of Sewerage & Sanitation Facilities
- (b) Financing
- (c) Creating awareness on sanitation
- (d) Preparation and execution of sanitation plans for growing population
- (e) O&M of the Sanitation Facilities

Further, the 12th FYP document identifies specific agenda in urban water & sewerage sectors as:

1. Investment in water Supply will focus on Demand management, Reducing Intra-city Inequity and on Quality of Water Supplied.
2. Protection of Water Bodies.
3. No Water Scheme without Sewage component.
4. Plan for Recycling & Reuse of Treated Wastewater.
5. Plan on Regional Scale.

Keeping these plan agenda in view, the NMSH Standards in Urban Water Supply and Sewerage sector identify the following strategies for bringing about sustainability in the sector:

Water supply

1. Supply side management
2. Demand Side Management
3. Leakage Management - Reduction in NRW
4. Rain Water Harvesting
5. Water Audit
6. Use of Water Efficient Appliances

Sewerage

1. 100 % toilet coverage
2. 100% treatment of sewage
3. Recycle and reuse of waste water

Energy Efficiency

Another issue crucial for sustainable habitats, common to both water & sewerage sector is the energy efficiency.

The Bureau of Energy Efficiency (BEE) has identified water pumping systems and sewage conveyance & treatment systems as some of the major energy loads in municipalities. It has targeted both water and sewage treatment & pumping among the municipal energy efficiency audit. The goal is to provide municipal water supply and sewerage services at the least cost and least environmental impact as energy involves burning of fossil fuels. BEE has identified 171 ULBs for energy efficiency studies under the MUDSM (Municipal Demand Side Management) Programme being implemented in phased manner. Investment Grade Energy Audit (IGA) has been completed across 112 ULBs and is in progress for the rest 64 ULBs. ULBs' capacity in energy efficiency needs to be built by BEE. ULBs can also take up energy efficiency studies and measures proactively, based on BEE guidelines.

The detailed recommendations of the committee are as follows:

Supply side management

1. Water utilities should be encouraged to create/develop own sources for water supply to avoid conflicts with irrigation/agriculture sector.
2. In case of multi-purpose projects, ensuring first priority of allocation to drinking water supply from available storages at any point of time.
3. Long-distance water supply systems must service all habitations en-route, where feasible, covering a reasonable distance on either side.
4. Local sources of water such as lakes, ponds, springs must be environmentally managed and used for water supply.
5. Conjunctive use of surface and ground water should be explored.
6. Water resources departments may adopt socially conscious actions such as imposing royalty on water; mandating water supply to all habitations in influence area; introducing efficiency incentives/disincentives on the quantum of water drawn w.r.t norms; imposing conditions for 100% treatment of waste (return) water and if not, penalties thereof.
7. Quality of source water for water supply shall be ensured and sound surveillance systems implemented.
8. Mapping and digitization of water supply networks for distribution shall be done on continuous basis. Hydraulic modeling shall be adopted for rationalizing pipe networks and ensuring equitable pressure.
9. Intensive and continuous public campaigns implemented for awareness on all water related aspects- the real worth of water; health & economic losses due to polluted water, wastages and even shortages.

Demand side management

1. Adoption of universal consumer metering and volume based tariff.
2. Over-consumption of water to be controlled by escalating tariff blocks. Lifeline access of 20 lpcd (as per WHO & UNICEF) can be subsidized whereas at consumption level of 135 lpcd, full cost recovery should be built into tariff. Consumption beyond the benchmark should attract progressively increasing tariff. This will lead not only to sustainable consumption but also revenue generation and promotion of equity.
3. Tariff should consist of a separate 'energy surcharge' worked out per unit of water delivered. It should be the minimum charge on even the lifeline consumption. It should be related to the unit energy charges and adjusted/escalated automatically as per the changes in energy charges.

4. Water supply shall be on 24x7 for equity, effective metering and for best hygiene model of supply. Systems leaks & thefts can easily be revealed only with a 24x7 supply pattern.
5. Water meters and conveyance pipe upto private property line but including the meter, meter box, valves etc., shall be the property of water utility/ULB. Tampering, theft and scrap dealing in these materials shall be made illegal and offenders prosecuted.
6. The utility/ULB shall levy a meter rent (preferably as % of water consumption bill). Testing and calibration of meter shall be responsibility of utility/ULB, along with its repair and replacement.
7. The utility/ULB shall make a provision in the form of depreciation fund/sinking fund at about 5% of assessment/bill and these funds may be used towards replacements and repairs.
8. Incentives for using treated wastewater water and also from decentralised local sources.

Leakage Management and Reduction of NRW

1. Universal metering shall be adopted.
2. Illegal connections shall be identified through water audit and community participation.
3. The free connections shall also be metered and regulated such as free supply up to a pre-determined quantity;
4. The staff responsible for water supply shall also be made responsible for the leakage, theft identification and their control.
5. The system shall be pressurised 24x7 and visible leaks repaired immediately. However, automatic pressure management systems for reducing the pressure under minimum demand conditions can be adopted to reduce overall NRW.
6. Purchase of leak detection equipment and use should be last step in implementing the measures for reducing NRW.

Rain Water Harvesting

1. RWH and recharge recommended to be made mandatory.
2. Wherever the number of rainy days is high, rainwater storage & use systems shall be used. Incentives may be provided on the quantum of water consumption avoided from the organized water supply system.
3. Ground water recharge areas need to be delineated, mapped and protected.
4. Low lying areas, lakes and flood plains may be identified and reserved for storing rain water for better environmental conditions.

5. Local nallahs, drains and streams shall have low-level check dams for storing rain water and improving recharge in the areas.
6. ULBs/ Town Planning authorities shall identify and reserve 2-5% of development area for water bodies, either natural or constructed.
7. A system of Ground Water Table monitoring wells may be developed at ward level. To be used for assessing efficiency of RWH measures and also warnings against excessive exploitation of ground water.

Water Audit

1. Utilities/ULBs shall adopt universal metering for consumers, bulk supply and transfer etc., of water for enabling measurement of system input and output and calculate the losses.
2. Utilities/ULBs shall develop management tools/ formats for daily assessment of Water Balance for each source/system/zone using data of Water supply & delivery.
3. All consumer premises shall be checked for no-direct water supply condition in meter-shut off position for identifying water theft and illegal connections.
4. The water supply and other utilities networks shall be mapped and city & zonal digital maps prepared for frequent check & validation of the infrastructure. The new developments and additions in infrastructure shall be regularly added to the database and digital maps.
5. Water Audits may be carried out at periodic intervals.

Water Use efficiency in Fittings/Fixtures

1. Smart water saving fittings(taps/faucets, flushing tanks, water closets, urinals, bidets and bath tubs) may be promoted through citizen information as well as fiscal incentives for manufacturers.
2. Water saving automatic taps; air-mixing taps and soft closing taps may also be promoted through citizen awareness programme.
3. Showers with consumption displays and with announcements for wastages may also be promoted.
4. Fittings with automatic controls shall be mandated for high footfall locations.

Sewerage – sanitation

Complete access to sewerage – sanitation

1. Access to sanitation facilities shall be universalised (100%) without any barriers of any cost/fee, land tenure etc., including urban poor settlements, unauthorized slums / colonies.
2. All properties/ holdings should be connected to sewerage system, even if they are not connected to a public/municipality water supply system.
3. Sewerage system need not be the only sanitation system for liquid waste. Hence, Onsite sanitation systems shall be adopted for less dense settlements.
4. Sewerage charges shall be levied on the basis of water consumed and in the water bill itself. In case of no water supply, alternative methods of billing shall be used.
5. Sewerage charges should also have an energy surcharge/component, which shall be directly linked to the unit energy charges levied by the power utility.
6. In view of the higher polluting potential, sewerage charges should reflect full cost recovery for all sewerage O&M operations.
7. For on-site sanitation, periodic cleaning shall be ensured. ULB may provide the equipment at a fee and also for final disposal, depending on the type of on-site treatment involved.
8. Buildings may have double-stack plumbing system for separation of grey & black water.
9. On-site packaged treatment units may be used to treat grey water, black water or a combination, depending on the user choice.
10. Using a combination of on-site and off-site sewerage / sanitation systems for waste water / sewage, 100% treatment shall be ensured, for environmental protection and sustainability.
11. It is suggested that Sewage Management Rules, similar to Municipal Solid Waste (Management & Handling) Rules may be framed and notified under the EPA & Water Pollution Acts etc., in order to consolidate provisions under different Acts/Rules/Notifications and to focus attention on Sewage Management issues. Guidelines/Standards for Septage management and Reuse of Treated Wastewater have to be formulated.

Recycle and reuse of wastewater

1. In case of multi-storeyed constructions and gated communities, internal dual piping for toilet flushing shall be made mandatory. It shall also be mandated for high end users such as Hotels, Malls and Industries.

2. Such building communities and groups of housing implementing dual piping shall also ensure on-site treatment of waste water to the water reuse standards of the nation or as per international best practices till the national standards are developed.
3. Supply of treated wastewater to industrial and other consumers shall be explored.
4. Utilities/ULBs may provide incentive on the quantity of waste water treated and reused for which separate metering may be necessary.
5. Dual piping at street level shall continue to be prohibited due to the public health risks involved. However, dual piping at street level may be adopted in cities with well laid out service ducts and with 24x7 water supplies but the pressure in the main water supply network shall always be maintained at least twice of the pressure in the dual pipe carrying treated wastewater.
6. The water for reuse may be mandatorily coloured.
7. Models for reuse of used-water may be developed and its applications identified and widely propagated for encouraging reuse at local level (E.g. Israel is said to practice reuse 6-7 times before the intervention of treatment system. This may be studied and intensive water users encouraged to adopt such practices).
8. Incentives may be provided to customers (in water tariff, property tax etc) for the recycle and reuse of treated wastewater.

Energy Efficiency

Energy Audit may be mandated at prescribed intervals for efficient functioning of electro-mechanical equipment in the sector.

Mainstreaming of Service Level Benchmarks (SLBs) for sustainability

The service level benchmarks earlier referred to in the report have been formulated by the MoUD with a view to achieving all-round sustainability including environmental sustainability. Accordingly, in addition to the specific recommendations above, the committee suggests that implementation of service level benchmarking which implies an outcome oriented approach be mainstreamed further at every stage i.e. planning, implementation and monitoring. In recognition of the fact that the SLB framework may not be met initially, a range of values for SLB indicators has been suggested as per the chart (on the next page) for different grades of sustainability, the ideal being the SLBs themselves.

Water Supply

S. No.	Indicator	Green (Sustainable)	Black (Deficient & degrading)	Red (Excessive and degrading)
1	Coverage of connections	100%	<90%	----
2	Per capita availability of WS at consumer end	135 Lpcd	<100	>200
3	Extent of metering of WS connections	100%	<100%	----
4	Extent of Non-Revenue Water	15%	----	>20%
5	Continuity of Water Supply	24 Hrs	<16	
6	Efficiency of redressal of Customer Complaints	80%	<70%	----
7	Quality of Water Supplied	100%	<100%	----
8	Cost recovery of in Water Supply Services	100%	<90%	----
9	Efficiency in collection of Water Supply Charges	90%	<90%	----

Sewerage

S. No.	Indicator	Green (Sustainable)	Black (Deficient & degrading)	Red (Excessive and degrading)
1	Coverage of Toilets	100%	<100%	----
2	Coverage of Wastewater network services	100%	<90%	----
3	Collection efficiency of Wastewater network	100%	----	----
4	Adequacy of Wastewater treatment capacity	100%	<90%	>120%
5	Quality of Wastewater treatment	100%	<95%	
6	Extent of reuse & recycling of treated Wastewater	20%	<10%	----
7	Extent of cost recovery in Wastewater management	100%	----	----
8	Efficiency of redressal of Customer Complaints	80%	<80%	-----
9	Efficiency in collection of sewerage-related charges	90%	----	----

2.1.2 Municipal Solid Waste Management

The sub-group constituted by the Ministry in its meeting held on 5th March, 2012 deliberated on the report of sub-committee and considered the observations made by various participants in the consultative workshop convened on 29th February 2012 and the provision made in the draft MSW Rules, 2012 with a view to finalize the report brought by the sub-committee. The committee has further deliberated on the issue of fixing standards & timelines to achieve verifiable indicators to measure the performance of States & ULBs. The committee is of the view that subject of SWM needs special attention to make the cities and towns liveable and address the issues of climate change related to SWM in a concerted manner.

Developing institutional capacity, implementing appropriate and adequate governance mechanisms, promoting community participation and education, training & capacity building of all levels of stakeholders, establishing waste reduction targets, ensuring efficiency in operation of waste management facilities, defining economic incentives and penalties - are all aspects to be strengthened and monitored to ensure climate sustainable waste management in the country .

To achieve the objectives of the National Sustainable Habitat Mission, the sub-committee on solid waste management has made recommendations in four broad areas: Governance & finance, Training & Capacity Building, Community Participation & Awareness and Solid waste management Activities in ULBs:

1. Governance & Finance:

- a. Each state to have a special cell on SWM in Urban Development Department to ensure that cities/towns work in a concerted manner to achieve the benchmarks fixed by MOUD as well as proposed by the committee and meet their obligations envisaged in MSW Rules, 2000/2012.
- b. Each State should develop a Sanitation Strategy under NUSP, clearly outlining the State Level Solid Waste Management Strategy. City Sanitation Plans prepared by each city should contain a clear cut action plan for SWM addressing how the city plans to

implement relevant Rules and achieve benchmarks (under NSHM and SLB) in the given timeline.

- c. Each district to have a nodal officer under the District Magistrate/Collector to ensure compliance of the Rules in the district.
- d. Each municipality to frame bye-laws incorporating the provisions contained in the MSW Rules, 2000/ 2012. Municipal authorities may suitably amend existing byelaws or frame new byelaws to ensure compliance of MSW Rules, 2000/2012; achieve the benchmarks and the standards indicated above and seriously follow the guidelines given in the National Manual on Solid Waste Management published by MOUD. The Byelaws may include levy of spot fine to those who litter, burn and violate the directions of ULB for managing the waste effectively.
- e. Each municipality to have in place qualified supervisory staff as recommended in National Manual on Solid Waste Management/Supreme Court Committee Report to implement Rules effectively.
- f. Each municipality to allocate adequate budget for providing efficient SWM service to the community.
- g. Each municipality to levy user charges and/or solid waste management tax (either clubbed with property tax or separately) to meet the O&M and part of capital cost of SWM Service.
- h. Each municipality to encourage private sector participation on PPP Model to bring professionalism, efficiency and economy in the provision of SWM services, especially with respect to treatment and disposal of municipal solid waste. The contracts for the PPP should be based on measurable indicators catering to service level improvements in solid waste management by the private party, with adequate safeguards to monitor the performance of the private operator
- i. Each municipality to have efficient public grievances redressal mechanism.
- j. The State/District town planning authority to earmark suitable land to meet the requirements of next 30 years for processing and disposal of waste in the district development plan/metropolitan development plan.

2. Training and Capacity Building

- a. Each ULB to set apart at least 2.5 % of their Revenue Budget for training & capacity building each year with special focus on SWM. Training programmes may be organized in line with the Government of India, Department of Personnel & Training Guidelines dated 19.01.2012.
- b. Training should be imparted to all categories of staff under solid waste management, as per their specific needs and requirements. Where, some of the SWM activities are outsourced, it is required that ULB staff be trained to acquire knowledge and skills on contract management and technical aspects of processes to be implemented by the operator, in order to be able to effectively monitor service provision by the private party.
- c. There should be an on the job training for staff of different categories, especially the *safaikaramacharis* in good/current practices of handling solid waste before they are allowed to start work, especially with respect to health and hygiene and segregation related aspects.

3. Community Participation & Awareness

- a. IEC is considered very important to ensure Community Participation in SWM. The Concept of **Reduce, Recover, Reuse & Recycle (RRRR)** may be propagated by ULBs to promote reduction, reuse, recycling and recovery of waste. Children being the agents of change, they should be given exposure to best practices of managing waste at home and in schools. There should be emphasis of community involvement in the management of waste at home, in the city and at the workplace.
- b. City administrations should make use of the National School Sanitation Initiative (NSSI) (www.schoolsanitation.com) and request their schools to register and get support as part of awareness and IEC activities under CSP.
- c. SWM should be incorporated in school curriculum to inculcate good practices of managing waste from very childhood. Special training programmes may be organized in the schools to apprise school children of appropriate SWM practices using standard training material through trained teachers. Initially atleast 20 % of schools should be targeted each year, until all 100% schools are covered. Further on, this initiative may be continued as an on-going activity every year.

4. Solid Waste Management Activities in ULBs

- a. Reduction in waste generation – Community sensitization:** The most fundamental and prioritized aspect of the internationally accepted waste hierarchy - waste reduction - needs to be adequately addressed, especially from a resource conservation and climate change mitigation perspective. Waste reduction/avoidance/waste minimization conserves resources, saves energy, and reduces pollutants and greenhouse gas emissions. Waste reduction also reduces the burden of increased waste handling and management costs on the ULBs. Hard to find landfill space will also be reduced. In this regard the community needs to be sensitized to minimize waste generation and the ULBs should focus on a multi-pronged strategy to ensure waste reduction. A key indicator to assess the efficacy of such actions is to monitor the annual reduction in waste generation. Waste reduction may be achieved through implementing programmes involving extended producer responsibility, sustainable packaging initiatives, reducing use of plastic and encouraging recycling of household hazardous products (batteries, electronic components and electronics).
- b. Segregated storage at Source:** Storage of bio-gradable & non bio-gradable waste in separate bins at source of waste generation may be insisted to promote recycling and minimizing waste going to processing and disposal facilities and reducing hurdles of recognition of recyclable waste.
- c. Recycling/Material Recovery:** The benefits of resource recovery include conserving natural resources and energy, reducing related GHG emissions and landfill space and increasing ensuing economic benefits. Currently, given the nature of the informal sector dealing with recycling of materials, it is not possible to calculate the efficiency of recycling/material recovery within the city. However a policy framework to encourage formalization of this sector through NGOs and promoting collecting recyclables from the source of waste generation is recommended towards assessing the efficiency of recycling and minimizing the cost of collection and transpiration of waste to the processing and disposal facilities.

- d. Collection and Transportation of Segregated Waste on a daily basis:** Source segregation of waste is a key factor in increasing the efficacy of resource recovery from municipal solid waste. The supply of segregated waste will also greatly enhance the efficiency of solid waste management plants, since current segregation practices in these plants is at best, ad-hoc. Increasing efficacy of resource recovery will lead to mitigation of GHG emissions through avoided production of virgin materials and reduction of unprocessed MSW. While, the SLB benchmark on source segregation squarely addresses this issue, the collection and transportation of segregated waste should also be emphasized to ensure potential efficiencies. Segregated transportation of inerts from street sweeping activities shall also be emphasized, as this would result in an efficient processing of other waste streams (biodegradables and other recyclable material).
- e. Secondary storage:** It is important to reduce and finally do away with secondary storage bins, wherever feasible. In larger cities, where secondary storage points cannot be eliminated, covered bins/facilities should be provided to prevent indiscriminate burning of wastes and mixing of segregated wastes.

Parameters, for determining the number of depots in the city should be based on:

- 1) Population per sq. km
- 2) Max distance a sanitation worker is expected to walk
 - Based on the density of population in each ward, covered containers may be kept at suitable locations which can hold 50% extra waste than what is expected to be generated in that area. 450 kg per m³ may be considered as density of waste.
 - Distance between two waste storage depots should not be more than 500 meters, so that the sanitation workers do not have to walk more than 250 meters with hand cart.
 - If sanitation worker is given tri cycle óThe max distance between 2 bins could be 1 km so that the sanitation worker does not have to travel more than 500 meters to dispose the waste in the container.
 - The type size of the container should be selected depending on the road width and type of the vehicles to be used.

- f. Facilities for Treatment & Disposal of Waste:** The Service Level Benchmarks clearly indicate that 100% waste disposal through scientific means should be achieved. It is however a well-known fact that land acquisition for treatment/landfill facilities is a major challenge for all ULBs. Clear time lines are required for acquiring such facilities and the following suggestions may be considered as guidelines:

Proposed timeline for waste treatment facilities:

- Land identified, obtained for treatment plant & preparation of design for treatment plant: 1st year
- Tender for construction of treatment plant: 2nd Year
- Construction of treatment plant & its operationalization: 3rd Year

Proposed timeline for treatment of waste:

- 50% by Year 4
- 100% by Year 5

- g. Composting:** Composting municipal solid waste avoids methane emissions that would otherwise result from dumping organic wastes and the resultant methane emissions. In many of the compost plants, indefinite storage due to lack of timely sales defeats the purpose of processing organic waste. Where, composting plants are proposed/operational, the percentage of biodegradable material treated versus the amount generated will clearly indicate the sufficiency and efficient management of these facilities. Piling of stocks also results in anaerobic conditions leading to an increase in methane emissions. Therefore it is also important to quantify and monitor the sale of finished compost, which may otherwise be dumped in inappropriate locations and conditions.

- h. Disposal of inerts & rejects from process plants:** In India the importance of composting and processing of recyclable wastes has been well established and enshrined in the Municipal Solid Waste Management & Handling Rules, 2000. It is an accepted practice that all inert wastes and rejects from processing plants shall be disposed in scientific landfills. However, if efficiency of waste processing plants is not

ensured and material recovery programmes are not institutionalized, the quantity of organics and recyclables being diverted to landfills shall have a direct impact on direct and indirect GHG emissions. Hence, monitoring the amount of waste diverted to landfills from waste processing facilities is to be monitored on a regular basis.

i. Proposed timeline to waste disposal facilities:

Construction of engineered landfills are essential to ensure safe disposal of waste and for preventing air, land & water contamination. Pending construction of treatment facilities, municipal solid wastes cannot be allotted to be disposed in open. Therefore, while efforts may continue as per the timeline to construct treatment facilities and minimize the waste going to landfills, engineered landfills must be constructed to receive all the inter as well as untreated municipal waste adopting the following timeline:

Proposed timeline for waste disposal facilities:

- Land identified, obtained for disposal facilities & preparation of design for Engineered landfills : 1st year
- Tender for construction of engineered landfills : 2nd Year
- Construction of engineered landfills & its operationalization: 3rd Year

Proposed timeline for sewage scientific disposal of waste:

- 50% by Year 4
- 100% by Year 5

j. Capping of Old Dumpsites: Each municipal authority should list out old abundant waste disposal sites and work out a plan of action for capping those sites. The existing dumpsite may continue to be used till new site is identified and sanitary landfill is constructed thereon. The ongoing disposal site may be capped scientifically after the date of operationalization of the new landfill site. Capping may be done in accordance MSW Rules, 2000.

Proposed Timeline:

- Identification of Old dumpsites in the city: 6 months
- Designing & Capping of old dumpsites: 3 Years

- Designing & Capping of existing dumpsites: 2 Years from the date of Operationalization of the engineered landfill.

Verifiable Indicators for Municipal Solid Waste Management

The Ministry of Urban Development has identified the Service Level Benchmark indicators for provision of solid waste management services. The SLB indicators are given below for adoption.

S. No	SLB Indicator	Target
1	Household level coverage of Solid Waste Management services	100%
2	Efficiency of collection of municipal solid waste	100%
3	Extent of segregation of municipal solid waste	100%
4	Extent of municipal solid waste recovered	80%
5	Extent of scientific disposal of municipal solid waste	100%
6	Extent of cost recovery in Solid Waste Management services	100%
7	Efficiency in redressal of customer complaints	100%
8	Efficiency in collection of SWM related user related charges	90%

In addition, the sub-committee has proposed the following indicators for efficient Municipal Solid Waste Management. These indicators address issues specifically related to provision of service in a sustainable manner, focusing on strengthening institutional mechanisms and building efficiencies within service provision to address climate change mitigation.

A. Governance & Finance

1. Whether State Level Solid Waste Management Strategy as part of the State Sanitation Strategy under NUSP has been prepared by the State (Yes/No)
2. Whether SWM Action Plan as part of CSP under NUSP has been prepared by each city to achieve benchmarks including PPP strategy (Yes/No)
3. Whether the State has set up a SWM Cell to monitor compliance of state level solid waste management strategy, which is in line with MSW Rules, 2000/2012 (Yes/No)

4. Whether each district in the State has designated a trained nodal officer to ensure compliance of MSW Rules and benchmarks (Yes/No)
5. Whether ULBs have framed bye-laws on the lines of MSW Rules, 2000/2012 and SLBs (Yes/No)
6. Whether each ULB has in place qualified staff as per CPHEEO Manual for SWM (Yes/No)
7. Does the ULB apportion funds for O&M of solid waste management systems (Yes/No)
8. What are the ULBs annual revenue budget in allotted SWM services
9. Does the ULB plan for capital investments for provision of SWM services once every 5- 7 years? (Yes/No)

B. Training and Capacity Building

1. What percentage of Revenue Budget is set apart for Training and Capacity Building? What percentage of staff has been imparted training?

Target: At least 2.5% of revenue budget for training and capacity building per institution and year with special focus on SWM spent.

C. Community Participation & Awareness

1. Whether school curriculum contain a chapter on SWM (Yes/No)
2. No. of teachers per schools, who are able to give qualified SWM trainings

Target: 1 teacher per school

3. Percentage of schools, which engage all students once per year in qualified SWM trainings

Target: 100%

Proposed timeframe for Implementation: First year: 20% of schools, after 5 years 100%

4. Frequency of awareness generation programmes focusing on sustainable SWM in the City (Monthly/Quarterly/Half-yearly/Yearly/Others)

D. Solid Waste Management Activities at the ULB level

1. Annual Reduction in Waste Generation: $((\text{Waste generated in year X} \div \text{Waste generated in year X+1}) / (\text{Waste Generated in year X})) * 100$

Target: 10% reduction by 2015 over 2012 values

2. **Abolition of open secondary waste storage sites:** (No. of waste storage sites replaced by covered containers or abolished in ULB /total no. of open waste storage sites)* 100

Target: 100%

Proposed timeframe for Implementation: Year 1 2 3
50% 75% 100%

3. **Segregated collection & disposal of street sweeping:** (Quantity of inerts from street sweeping collected and transported in a segregated form to disposal/processing site)/Total quantity of inerts from street sweeping

Target: 100%

4. **Efficiency of Transportation of Segregated Waste :** (Quantity of waste collected and transported to processing facilities in a segregated form/total quantity of waste generated) *100

Target: 100%

Proposed timeframe for Implementation: Year 1 2 3
50% 75% 100%

5. **Efficiency of Treatment of bio-degradable waste –** (Quantity of bio-degradable waste treated/total bio-degradable waste generated) * 100

Target: 100%

Proposed timeframe for Implementation: Year 4 5 6
50% 75% 100%

6. **Re-use of compost produced:** (Quantity of compost sold/quantity of compost produced)*100

Target: 100%

7. **Efficiency of Scientific Disposal of Waste**

(i) Whether landfill sites identified: Yes / No
(Time Line One year)

(ii) Whether landfills facility designed and constructed : Yes/No
(Time Line within 3 years)

(iii) Whether scientific disposal of waste commenced? Yes/No

(iv) What percentage of mixed waste coming to landfill is reduced?

Time line	Year	4	5	6
		50%	75%	100%

(Expectation: 20% inert wastes only should go to landfill)

8. **Indicator: Diversion of MSW to landfills from processing facilities:** (Quantity of waste being disposed in landfills/ Total quantity of waste being handled in waste processing/recycling facilities) * 100

Target: To be less than 20%

9. Whether the State/District/ ULB town planning authority has earmarked suitable land for processing and disposal of waste in the district development plan/metropolitan development plan (Yes/No)

10. What percentage of old dumpsites has been capped by the ULBs?

Target: Old dumpsites: 100% within 3 years. Active dumpsites: 2 years from year of operation of engineered landfill

11. Penalties imposed on the defaulters littering on the streets, burning or not adhering to directions of municipal authority for implementation of MSW Rules, 2000. (Yes/No)

12. Percentage of revenue from penalties (for not adhering to MSW bye-laws) which is used for SWM improvement: (Penalty revenue used for SWM improvement/Total penalty revenue)*100.

Target: 100%

Mainstreaming of Service Level Benchmarks (SLBs) for sustainability

Service level benchmarks have been formulated by the MoUD with a view to achieving all-round sustainability including environmental sustainability. Accordingly, in addition to the specific recommendations above, the committee suggests that implementation of service level benchmarking which implies an outcome oriented approach be mainstreamed further at every stage i.e planning, implementation and monitoring. In recognition of the fact that the SLB framework may not be met initially, a range of values for SLB indicators has been suggested as per the chart below for different grades of sustainability, the ideal being the SLBs themselves.

A. Mandatory Parameters

S. no	Indicator	Sustainable Standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
Existing parameters under Service Level Benchmarks (SLB)						
1	Household level coverage of SWM services	100%	<75%	<50%		
2	Collection efficiency of MSW	100%	<75%	<50%		
3	Extent of segregation of MSW	100%	<75%	<50%		
4	Extent of MSW recovered	80%	<60	<50%		
5	Extent of scientific disposal of MSW	100%	<75%	<50%		
6	Efficiency in redressal of customer Complaints	80%	<60%	<50%		
7	Extent of cost recovery in SWM services	100%	<75%	<50%		
8	Efficiency in collection of SWM charges	90%	<75%	<50%		
Additional Parameters						
9	Efficiency of door-to-door collection and transportation of household waste to the treatment plants	100%	<75%	<50%		
10	Treatment and disposal of bio-degradable waste	100%	<75%	<50%		

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S. no	Indicator	Sustainable Standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
11	Identification of land for recycling, treatment and disposal of MSW for the next 30 years	100%	<75%	<50%		
12	Leachate collection & treatment from landfills	100%	<75%	<50%		
13	Bioremediation of existing landfills	100%	<75%	<50%		

B. Desirable Parameters

S. no	Indicator	Sustainable Standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
1	Road sweeping efficiency	100%	<75%	<50%		
2	Collection and transportation of road sweepings to the landfills	100%	<75%	<50%		
3	Recycling of construction & demolished waste	90%	<75%	<50%		
4	Imposition of penalty on the defaulters who litter on streets/public places/storm water drains (households/restaurants / establishments / public)	100%	<75%	<50%		

2.1.3 Urban Storm water Management

Development of Indices

The approach followed for development of standards was that "What gets measured gets managed". The development of parameters is essential for developing legal frame work/regulations to improve urban planning in respect of storm water drainage. Based on detailed deliberations, the following main parameters have been identified, which will enable developing legal frame work/regulations to improve the urban planning in respect of storm water drainage and minimize the incidence of flooding in urban areas.

To assess and monitor the progress of implementing sustainable stormwater management, there is a need to develop key parameters and indicators. These parameters/indicators are generally in the form of indices, for systematic and scientific assessment of situation, progress and deficit. Therefore, each of the indicators designed for stormwater management should serve the purpose and promote understanding of where we are, where we are going and how far we are from the goal, which can be further aggregated to form complex indices. Based on this approach, a set of parameters/indicators in the form of indices have been developed which need to be considered at all stages of development namely, planning, implementation and operation and maintenance subject to its appropriateness and significance to the specific stage. The parameters/indicators, in order of priority, are assigned two sets of values viz. First value is for ideal condition and second value is minimum desirable one.

1. Drainage Cleaning Index: (1.0/0.67)

This is a very important parameter as regards, routine operation & maintenance / cleaning of drains. It is opined that cleaning should be done at least three times a year.

(i) First, the process must start by 31st March each year and be completed one month before the normal arrival of monsoon each year. (ii) The drains should also be thoroughly cleaned after first heavy shower, (iii) subsequently, after retreating of rain i.e. in the post monsoon, the cleaning of drains is essential. In addition, the ULBs may clean drains regularly, as per requirement. The availability of trained manpower and O & M Manual for operating and maintaining drainage system also need to be ensured.

2. Water logging Index: (0)

This index is to reflect the sustainability of an area to incidences of water logging. Presently, the area inundated for four hours or more and having water depth more than 60 are considered as affected by water logging. However, to make our cities more sustainable and disaster resistant, the duration of 4 hours should be reduced to 1 hour based on experiences in cities like Delhi and Mumbai. (Flood prone area is categorized as one having 15 houses or more which are affected by flood).

3. Water body Vulnerability Index: (1.0/0.6)

In regard to the habitations in the existing water bodies/flood prone areas, it was proposed that the ratio of total area under water bodies encroached (present date) to the total area under water bodies (on a datum date) may be used as an indicator.

4. Complaint Redressal index: (1.0/0.9)

A certain eligible category of complaints registered and those addressed may be considered as an indicator of the efficiency of stormwater O & M. The index may be defined as the ratio of drainage-related complaints addressed satisfactorily to the total number of drainage-related complaints.

5. Drainage Coverage(Constructed) Index: (1.0/0.7)

Level of coverage of an urban area with man-made storm drainage systems. This index can be defined as the ratio of the length of existing constructed drains to the length of total constructed drains required for an area.

6. Rain water Harvesting/Artificial Ground water Recharge Index: (0.3)

With reference to the encroachment of natural streams passing through urban, it was observed that on one hand, the pathway / water line of natural streams are being blocked / constructed and on the other hand, more and more developments are coming on by paving the way in enhancing the run-off causing increased peak flow and frequent inundation in urban area. To overcome this, rain water harvesting to be made mandatory, while following building bye-laws and at suitable places, considering the overall suitability, artificial ground water recharge also to be encouraged. The recharge index may be defined as the ratio of the rainwater volume stored/harvested to the ratio of the measured rainfall volume. In the planning level itself, 2 to 5% of urban area should be reserved for water bodies to work as recharge zone.

7. Sewage Mixing Index: (0)

Incidences of mixing of sewage with storm water to be avoided / prohibited. The index may be defined as the ratio of the volume of sewage flows entering the storm water drainage system to the total volume of flows in the storm water system.

8. Water bodies Rejuvenation Index: (1.0/0.8)

This index is to define the sustainability of the water bodies (past and present). For the rejuvenation of water bodies, the ratio of total area under water bodies planned for rejuvenation to the total area of water bodies including those encroached upon may be used as an indicator.

9. System Robustness Index \leq (1.0)

For areas dependent on pumping, the index can be defined as the ratio of rate of incoming storm flow to rate of pumping.

10. Natural Drainage System Index: (1.0/0.7)

This index can be defined as the ratio of natural drainage systems up and running to the total natural drainage systems (as existing on a predetermined date) and can be used as an indicator for the sustainability of the natural drainage system.

11. Area Vulnerability Index: (0)

In regard to the habitations in low lying areas / flood prone areas, it is proposed that the ratio of total flood prone area (present date) to the total city area (on a datum date) may be used as an indicator.

12. People Vulnerability Index: (0)

Identify vulnerable points in the slums -Number of people affected in vulnerable area with or without drainage divided by total number of people staying in the vulnerable area (with or without drainage) may be an indicator.

13. Flood Moderation Index: (1.0/0.7)

Lakes/ponds are the best moderators. The index may be defined as the ratio of area not flooded due to moderation to the area that would have been flooded without moderation.

14. **Permeability Index- (0.3/0.7)**

This index can be defined as the percentage of the catchment which is impervious. (Note - Attempts should be made through sustainable drainage practices to restore the permeability index of the catchment to pre-development levels).

15. **Master Plan Index: (1.0/0.6)**

Existing storm water drains are provided based on comprehensive planning and designing or in piece-meal manner. The basic assumption is that each city has a basic master drainage plan and where none exists, the master plan would be formulated and the indices would also complement the formulation of the drainage master plan. This will enable the integration of the city's **drainage master plan** with the CDP.

16. **Tidal Index: < (1.0)**

Parameter based on cycle of high and low tide for coastal areas. The index may be defined as the ratio of tidal level for which the present protection is adequate to the maximum tidal level observed for that area/city.

17. **Rainfall Intensity Index: (variable)**

Defined as the ratio of the observed rainfall intensity to the rainfall intensity which causes flooding in that particular area. It will enable the determination of the sustainability of an area to flooding.

18. **Preparedness Index/ Early Warning Index: (1.0)**

This index would enable the quantification of the preparedness of the city/community and can be defined for each point on the drainage system as the **ratio of lead time to the flow time at the point**. Radar based advance warning system of rainfall as well as one based on real time rainfall intensity viz. critical rainfall intensity causing flooding /real time rainfall intensity likely to cause flooding in flood prone areas.

19. **Stormwater discharge quality Index: (1.0)**

This may be defined as the ratio of the measured value of Total Suspended Solids (TSS)/Bio-chemical Oxygen Demand (BOD) of the storm drain water to the prescribed limits of TSS/BOD.

20. **Climate Change Stress Index: (1.2)**

The matter regarding the overstressing of existing drainage infrastructure due to climate change was also considered. As per the recommendations of International Conference on Urban Drainage in 2008, 20% increase in calculated discharge suggested for designing for future storm water drains was agreed. The index may be defined as the ratio of the projected rainfall intensity for a city to the present rainfall intensity being used for design for that city.

Mainstreaming of Service Level Benchmarks (SLBs) for sustainability

Service level benchmarks have been formulated by the MoUD with a view to achieving all-round sustainability including environmental sustainability. In recognition of the fact that the SLB framework may not be met initially, a range of values for SLB indicators has been suggested as per the chart below for different grades of sustainability, the ideal being the SLBs themselves.

A. Mandatory Parameters

S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
Existing parameters under Service Level Benchmarks (SLB)						
1	Coverage of storm water drainage network	100%	<75%	<50%		
2	Incidence of water logging	0%	<25%	<50%		
Additional Parameters						
3	Construction of new drains and conversion of <i>Katchadrains</i> (untrained, natural	100%	<75%	<50%		

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S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
	drains) into <i>pucca</i> drains with additional provision to carry 20% discharge). (ratio of length of new drains and conversion of drains to the total length of drains)					
4	Cleaning and training of drains twice in a year. (ratio of length of cleaning/training of drains to the total length of drains)	100%	<75%	<50%		
5	Incidence of people affected in vulnerable areas and property damaged during flooding. (ratio of no. of people affected and properties damaged to the total population and properties)	0%	-	<.01		
6	Rejuvenation of water bodies once in two years (ratio of no. of water bodies rejuvenated once in two years to the total	100%	<75%	<50%		

NMSH : Adaptation & Mitigation Measures in Water Supply & Sanitation Sub-Sector

S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
	no. of water bodies identified for disposal of storm water).					
7	Storm water drainage cess on the property tax (ratio of the total storm water cess realized through Property Tax to the total O&M cost).	100%	<75%	<50%		
8	Provision of pumping arrangement in low lying areas/water logging areas (ratio of no. of places where pumping arrangement is made to the total no. of low lying areas/water logging areas)	100%	<75%	50%		
9	Imposition of penalty on the defaulters who throw solid and untreated liquid waste into drains households/restaurant/ establishments/ public) (ratio of the no. of defaulters who pay penalty to the total no. of identified defaulters).	100%	<75%	<50%		

NMSH : Adaptation & Mitigation Measures in Water Supply & Sanitation Sub-Sector

S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
10	Extent of rain water harvesting in buildings etc. (ratio of the no. of buildings practicing water harvesting to the total no. of identified buildings in the municipal area).	100%	<90%	<80%		

B. Desirable Parameters

S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
1	Incidence of sewage mixing in the drains (ratio of no. of households discharging wastewater directly into the drains to the total no. of households).	0%	<25%	<50%		
2	Efficiency in redressal of customer Complaints (ratio of the no. of complaints received per day to the no. of complaints redressed within 24 hours)	80%	<60%	<50%		

NMSH : Adaptation & Mitigation Measures in Water Supply & Sanitation Sub-Sector

S. no	Indicator	Sustainable standards	Black (Caution for improvement)	Red (Immediate action for improvement)	Existing category	Commitment to achieve the category
3	Identification of water bodies for disposal of storm water (ratio of no. of water bodies identified to the total no. of water bodies suitable for disposal of storm water)	100%	<75%	<50%		
4	Coverage of population with early warning system (ratio of population covered with early warning system to the total population).	100%	<75%	<50%		
5	Provision for measurement of rainfall intensity (ratio of no. of places installed for rain fall gauge to the total no. of places identified for installation of rain fall gauges).	100%	<75%	<50%		
6	Reservation of land for creation of water bodies to work as recharge storage zone (% of urban area) (ratio of the land area required for creation of water bodies to the total municipal area).	5%	<3%	<2%		

2.2 Standards/ Manuals/Advisories

2.2.1 NMSH Standards on Ministry website

Details of NMSH standards uploaded on MoUD's website as per following links.

Sl. No.	Description	Weblink
1	Municipal Solid Waste	http://moud.gov.in/sites/upload_files/moud/files/mswm.pdf
2	Urban Storm Water Management	http://moud.gov.in/sites/upload_files/moud/files/uswm.pdf
3	Urban Water Supply and Sewerage	http://moud.gov.in/sites/upload_files/moud/files/uwss.pdf
4	Urban Planning	http://moud.gov.in/sites/upload_files/moud/files/plan.pdf
5	Urban Transport	http://moud.gov.in/sites/upload_files/moud/files/NMSH_UT_Parameters_DRAFT.pdf
6	Energy Efficiency	http://moud.gov.in/sites/upload_files/moud/files/Energy_Efficiency.pdf

2.2.2 Manuals

CPHEEO		
Sl. No.	Description	Weblink
1	Manual on Sewerage & Sewage Treatment	http://moud.gov.in/manual_sewage
2	Manual on Water Supply & Treatment	http://moud.gov.in/manual_ws
3	Manual on Municipal Solid Waste Management	http://moud.gov.in/swm_manual
4	Manual on operation & Maintenance on Water supply	http://moud.gov.in/publicinfo

2.2.3 Advisories

		MoUD Advisories
Sl. No	Description	Weblink
1	Advisory on Tariff Structure for Urban Water Supply & Sewerage Services	http://moud.gov.in/sites/upload_files/moud/files/advisory%20on%20water%20supply1.pdf
2	Advisory on Conservation and Restoration of Water Bodies in Urban Areas	http://moud.gov.in/sites/upload_files/moud/files/Urban%20Development_0.pdf
3	Advisory Note on Septage Management	1. http://moud.gov.in/sites/upload_files/moud/files/SeptageMgmtAdvMay20.pdf
4	National Urban Sanitation Policy 2008	http://moud.gov.in/NUSPpolicy
5	A Handbook on Service Level Benchmarks	http://moud.gov.in/servicelevel
6	Toolkit for Public Private Partnership frameworks in Municipal Solid Waste Management (in 3 volumes)	http://moud.gov.in/sites/upload_files/moud/files/SWM_PPP_Toolkit-Volume-I_0.pdf
7	Guidance note : Municipal Solid Waste management on Regional basis	http://moud.gov.in/sites/upload_files/moud/files/msw_guide_note.pdf
8	Guidelines for Decentralized Wastewater Management	http://moud.gov.in/sites/upload_files/moud/files/Guidelines_DWM_0.pdf
9	Guidelines for Preparation Of Detailed Project Reports And Selection Of Technologies For Processing And Final Disposal Of Municipal Solid Waste Using 12th Finance Commission Grants	http://moud.gov.in/sites/upload_files/moud/files/GUIDELINES%20of%20DPR%20and%20technology%20selection%20for%20SWM%20with%2012th%20Finance%20commission%20grant.pdf
10	A Guidance Note on Continuous Water Supply (24x7 Supply)	http://moud.gov.in/sites/upload_files/moud/files/Guidancefor_CWS.pdf
11	Advisory on Recent Trends in Technologies in Sewerage Systems	http://moud.gov.in/Note%20on%20Recent%20Trends

12	Advisory Note on Improving Urban Water Supply & Sanitation Services	http://moud.gov.in/sites/upload_files/moud/files/Advisory_Note_uwss_2.pdf
13	Toolkit on Solid Waste Management under JnNURM	http://moud.gov.in/sites/upload_files/moud/files/SWM-toolkit.pdf
14	Checklists for technical appraisal of DPRs posed to Ministry for availing Central Assistance under various programmes through OM no. A-11031/1/2011-CPHEEO dated 19.03.2012	http://moud.gov.in/sites/upload_files/moud/files/OM_Checklists_0.pdf
15	Technology Advisory Group Report on Municipal Solid Waste Management, which specifies selection of technologies on MSW	http://moud.gov.in/sites/upload_files/moud/files/tag_swm.pdf
16	Report on Integrated Plant Nutrient Management with a view to promote City Compost from garbage	http://moud.gov.in/sites/upload_files/moud/files/imtf_pnm.pdf

2.2.4 Awareness Creation

MoUD IEC Materials		
Sl. No.	Description	Weblink
1	PDF of CSP Baseline Assessment	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Baseline_Assessment_sheets.pdf
2	City Sanitation Plan webpage within MoUD website	http://www.moud.gov.in/cityplan
3	NUSP - CSP reports - Tirupati	http://cmsmoud.nic.in/sites/upload_files/moud/files/List_Of_CSP_Cities.pdf
4	NUSP - CSP reports - Varanasi	http://cmsmoud.nic.in/sites/upload_files/moud/files/List_Of_CSP_Cities.pdf
5	NUSP - CSP reports - Kochi	http://cmsmoud.nic.in/sites/upload_files/moud/files/List_Of_CSP_Cities.pdf
6	NUSP - CSP reports - Shimla	http://cmsmoud.nic.in/sites/upload_files/moud/files/List_Of_CSP_Cities.pdf

7	Kochi CSP Brochure	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Brochure_Kochi.pdf
8	Nashik CSP Brochure	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Brochure_Nashik.pdf
9	Raipur CSP Brochure	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Brochure_Raipur.pdf
10	Shimla CSP Brochure	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Brochure_Shimla.pdf
11	Tirupati CSP Brochure	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Brochure_Tirupati.pdf
12	GIZ-NUSP Fact Sheet 1	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Fact_Sheet_0.pdf
13	CSP Fact Sheet	http://cmsmoud.nic.in/sites/upload_files/moud/files/CSP_Fact_Sheet.pdf
Awareness Materials		
1	Urban Sanitation Audio Spots	Audio spots in 13 Languages
2	Urban Sanitation Audio Spots	Audio spots in 13 Languages

2.3 Innovative steps towards sustainable urban Development

2.3.1 Service Level Benchmark (SLB)

Ministry has proposed to shift focus on infrastructure with respect to sanitation including municipal solid waste management to improve the efficiency of service delivery. Ministry has formulated the set of Standardized **Service Level Benchmarks (SLBs)** for water and sanitation including municipal solid waste management. The SLBs have been circulated to the States in September 2008 for adoption in infrastructure development projects. All projects seeking Central Assistance is being appraised with respect to these Benchmarks.

BENCHMARKING

Benchmarking describes the process of improving performance through continuous identification, understanding and adapting outstanding practices and processes. It is emulating the best by continuously implementing change and measuring performance. It is a process of systematically comparing one's organizational structure, processes and performance against those of good practice organizations nationally and globally, with a view to achieve excellence. Benchmarking provides the key interface between identifying and understanding

the key criteria for change and attuning these to the reality of specific organizations. A benchmark is the standard of excellence against which to measure and compare. Benchmarking is the process of learning lessons about how best performance is accomplished. Benchmarking is discovering the specific practices responsible for high performance, understanding how these practices work, and adapting and applying them to the organization.

Benchmarking establishes a point of reference to judge performance on various indicators. It enables cities to discover how far behind their performance in specified areas. It facilitates continuous improvements to systems and processes. It promotes learning culture, helps prevent municipal complacency, allows urban local bodies to focus externally and constantly capture opportunities and counter potential threats, accelerate changes and restructure the systems and processes. It is a tool that provides municipalities with comparative results and as they prepare projects and make investment decisions to improve service delivery.

Benchmarking results in operational, financial and other benefits. It prevents reinventing the wheel, leads to 'outside the box' ideas by looking for ways to improve outside one's own organization, forces organizations to examine present processes, and contributes to accelerate change and restructuring by using tested and proven methods; convincing sceptics who can see how it works; and overcoming inertia and complacency and creating a sense of urgency when gaps are revealed. Moreover, it makes implementation more likely because of involvement of process owner. It allows the organization to focus externally and constantly capture opportunities and counter potential threats. It promotes emergence and evolution of a 'learning culture' in organization and promotes customer focused culture.

Benchmarking is now well recognised as an important mechanism for performance management and accountability in service delivery. It involves the measuring and monitoring of service provider performance on a systematic and continuous basis. Sustained benchmarking can help utilities to identify performance gaps and introduce improvements through the sharing of information and best practices, ultimately resulting in better services to people.

Recognising its importance, the Ministry of Urban Development (MoUD), Government of India, has launched the Service Level Benchmarking (SLB) initiative covering water supply, Sewage Management, solid waste management (SWM) and Storm water drainage. A databook on “**Service Levels in Urban Water and Sanitation Sector – Status Report (2010 – 2011)**” has been developed and released by the MoUD. It seeks to:

- Identify a minimum set of standard performance parameters for the water and sanitation sector that are commonly
- Understood and used by all stakeholders across the country;
- Define a common minimum framework for monitoring and reporting on these indicators; and
- Set out guidelines on how to operationalize this framework in a phased manner.

2.3.2 The 13th Finance Commission (FC)

The 13th FC noted the dilution of standards in the services provided by the local bodies. With a view to improve service delivery, the FC included the SLB as one of the nine mandatory conditions to be complied by the states and cities to access the performance grant of about Rs.8,000/- crores it recommended for the urban local bodies. Condition 8 of the 13th FC states that:

State Governments must gradually put in place standards for service delivery of all essential services provided by the local bodies. State Government must notify or cause all municipal corporations and municipalities to notify by the end of fiscal year (31 March) the service standard for four service sectors-water supply, sewerage, storm water drainage and solid waste management proposed to be achieved by them by the end of the succeeding fiscal year. All municipalities and municipal corporations in the state will provide a specified minimum level of service for each of the indicators for the four sectors such a commitment to be achieved through a consultative process with the local bodies a notification will be published in the State Government gazette and the fact of publication will demonstrate compliance with this condition.

SLB ROLLOUT STRATEGY

The MoUD to give effect to the FC recommendation and to help the states and urban local bodies launched a national rollout strategy is to extend capacity building and hand-holding support to the functionaries of state and urban local bodies to enable them to comply with the conditions of the FC including commitment to a minimum level of service standards and to define actions towards realizing the standards. As part of this strategy MoUD established a 13th FC Cell at NIUA.

METHODOLOGY

To operationalise the service level Benchmarking process in the States, MoUD advised the states to constitute **State SLB Core Team** consisting of senior functionaries from the State Urban Development departments, Parastatals, etc. They were headed by State level Nodal Officer. They were responsible to organize training to city level teams and other officials, extend hand-holding support to them where needed, coordinate database management at state level and to facilitate notification of baseline data and targets.

Cities were encouraged to form **City Level SLB Cell** consisting of officials from water supply, sewerage, storm water drainage and solid waste management. After training they were responsible for generation of baseline data, data validation, and fixation of targets and to prepare subsequently performance improvement plans.

ORIENTATION WORKSHOPS

MoUD organized state/regional level workshops (November 2010- February 2011 and in the year 2013-14) for members of State Level Core teams and City level SLB cell. These workshops presented the rationale for SLB, framework details, questionnaires for data collection and the programme implementation plan. Details of each of the indicators were explained and this was followed by discussion.

The Cities were given support in identifying appropriate data sources, collecting data as per the questionnaires, coordinating clarifications on definitional, methodological issues, etc. The orientation sessions helped in creating awareness for the operational staff, clarify data requirements and design strategies for gathering data.

VALIDATION OF DATA

At the workshops the cities brought basic data on all the indicators. Validation of the data was undertaken to ensure consistency between the data collected and the definitional requirements of the Handbook. The process entailed a review of the data collected by the city level SLB team, followed by modifications or corrections where necessary. After the data validation, support was extended to the States for target fixation. The SLB baseline data and targets for 2011-12 notified by the State Governments were compiled by the Ministry and presented in “**Service Levels in Urban Water and Sanitation Sector – Status Report (2010 – 2011)**”.

SLB NOTIFICATIONS BY CITIES/STATES:

In compliance of the 13th Finance Commission recommendations on service level benchmarks 1350 Cities from 9 States, 1405 Cities from 13 States and 1425 Cities from 15 States have notified their baseline and targets in the four sectors and the distribution of Cities, state wise is given below:

Status of Service Level Benchmarking (SLB) Gazette Notification				
		2012-13 STATUS	2011-12 STATUS	2010-11 STATUS
		Notification/ Publication of data	Notification/ Publication of data	Notification/ Publication of data
S. No.	State	No. of ULBs	No. of ULBs	No. of ULBs
1	Andhra Pradesh	171	167	124
2	Arunachal Pradesh			
3	Assam			

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4	Bihar			52
5	Chhattisgarh	87	43	43
6	Goa			
7	Gujarat	167	166	166
8	Haryana	75	75	
9	Himachal Pradesh (1+ 25)		26	49
10	Jharkhand		38	
11	Jammu & Kashmir			
12	Karnataka			52
13	Kerala	65	65	65
14	Madhya Pradesh		110	110
15	Maharashtra	252	252	249
16	Manipur			
17	Meghalaya			
18	Mizoram		1	
19	Nagaland			
20	Orissa		40	103
21	Punjab	142		
22	Rajasthan	184	184	184
23	Sikkim			
24	Tamil Nadu			
25	Tripura		1	1
26	Uttar Pradesh (13 + 194)	207	207	207
27	Uttarakhand		33	
28	West Bengal		127	
	Total	1,350	1,535	1,405

*The ULBs include Municipalities, Municipal Corporations.

2.3.3 National Urban Sanitation Policy, 2008

NUSP envisions "All Indian cities and towns become totally sanitized, healthy and livable and ensure and sustain good public health outcomes for all their citizens, with a special focus on urban poor and women". The overall goal of this policy is to transform Urban India into community-driven, totally sanitized, healthy and livable cities and towns.

- " NUSP mandates all the States to evolve their State Sanitation Strategy for City wide Sanitation
- " City Sanitation Plans advocated under NUSP to be prepared for each city is an action plan for tangible actions with clear time frames, which are like sector master plan to take care of the needs of sanitation requirements of a City.

State Sanitation Strategies:

Government of India recognizes that sanitation is a state subject and on ground implementation and sustenance of public health and environmental outcomes requires strong city level institutions and stakeholders. Therefore, it is best that each of the States develops its own State level Strategy to achieve the policy goals set out in the National Urban Sanitation Policy. Action Plans (CSPs) should precede with a Strategy (State Sanitation Strategy). Eleven States have formulated their draft Sanitation Strategies.

City Sanitation Plan:

With the support of Ministry, 157 Cities have taken up the process of preparation of City Sanitation Plans and 70 cities have submitted their draft CSPs.

City Sanitation Ranking:

As per the National Urban Sanitation Policy, the concept of a totally sanitized city is one which has achieved the outputs and milestones in respect of a set of objective indicators of Outputs, Processes and Outcomes envisaged under the NUSP. The Sanitation Rating survey initiated by MoUD based on the primary and secondary data sources to establish a comprehensive baseline with respect to waste (liquid and solid) generation, collection and disposal would place them through objective self-assessment, in the relevant sanitary category. The First Sanitation Rating, which was conducted in 2009-10 in 423 Class óI cities and the Second Sanitation Rating for all the 476 Class-I cities is under process and the work is expected to be carried out shortly.

No.	Category	Description	Points
1.		Cities on the brink of public health and environmental emergency and needing immediate remedial action	< 33
2.		Needing considerable improvements	> 34 <= 66
3.		Recovering but still distressed	> 67 <= 90
4.		Healthy and Clean city	> 91 <= 100

2.4 Developmental initiatives taken so far under various programmes of Ministry

2.4.1 Jawaharlal Nehru National Urban Renewal Mission (JnNURM)

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched by the Government of India on 3rd December 2005, envisaging an investment of more than Rs.1,00,000 Crore during a period of 7 years from 2005-06 to 2011-12 with a committed Central Government share of Rs. 66,000 Crore. JNNURM is a reform driven, fast track programme to ensure planned development of identified cities with focus on efficiency in urban infrastructure/service delivery mechanisms, and through community participation and enhanced accountability of ULBs/parastatal agencies towards citizens.

The programme focuses, higher level of resources and management attention to 65 select cities across the country. 35 cities with million plus population, other State capitals and cities of heritage and tourism importance comprise the 65 Mission cities under Urban Infrastructure & Governance (UIG). The other towns of 31 States/UTs are eligible for funding under the Urban Infrastructure Development for Small and Medium Towns Scheme (UIDSSMT).

Based on the city development plans prepared by the cities Ministry of Urban Development estimated the total infrastructure investment requirement of US \$ 67 billion (Rs. 3,35,000 Crore) for improving urban infrastructure, in only 65 largest cities in the country. More than 50% of this investment requirement is for transport and another 40% in basic service sectors like Water Supply, Sewerage, Drainage and Solid Waste Management.

JnNURM has attempted to trigger investments in the urban infrastructure sector and undertake reforms to sustain these investments. Notwithstanding the implementation challenges, it is and will continue to be a primary source of financing urban infrastructure. The JnNURM had the following major objectives:

- a) Focused attention to integrated development of infrastructural services in the cities covered under the Mission.
- b) Secure effective linkages between asset creation and asset management so that the infrastructural services created in the cities are not only maintained efficiently but also become self-sustaining over time.
- c) Ensure adequate investment of funds to fulfil deficiencies in the urban infrastructural services.
- d) Planned development of identified cities including peri-urban areas, out growths, urban corridors, so that urbanization takes place in a dispersed manner.

- e) Scale up delivery of civic amenities and provision of utilities with emphasis on universal access to urban poor.
- f) To take up urban renewal programme, i.e., re-development of inner (old) cities area to reduce congestion.

The main thrust of the Mission has been on major infrastructure projects relating to water supply (including setting up of desalination plants), sewerage and sanitation, solid waste management including hospital waste management, construction and improvement of drains and storm-water drainage system, road network, urban transport, construction and development of bus terminals, renewal and re-development of inner city areas, development of heritage areas, preservation of water bodies, and street lighting.

Details of Projects/Schemes being implemented

The JnNURM in its first phase (December 2005-March 2012) approved a total of 1344 projects in the aforementioned sectors under UIG and UIDSSMT having a total approved cost of Rs. 79,405.74 Crore. While the JnNURM first phase was extended by another 2 years upto March 2014 for completion of ongoing projects and achievement of reforms. However during this period further projects were approved under the Transition Phase to sustain the urban infrastructure needs of the country. The following tables illustrate details of funds in the two stages.

Table 1: Overall Approval Status of UIG & UIDSSMT (Projects sanctioned up to 31-03-2012)(Data as on 21.03.2014)

Particulars	<i>Rs. in Crore</i>		
	UIG*	UIDSSMT	Total
Mission Allocation	31,500.00	11,400.00	42,900.00
Approved Project Cost	65,394.94	14,010.80	79,405.74
ACA Committed	30,214.24	11,313.60	41,527.84
ACA Released (includes Rs. 72.27 cr. as A&OE expenses)	22,576.19	9,895.86	32,472.05
Cities/Towns Covered	65	671	736
Projects Approved	538	806	1,344
Projects Completed	227 (42%)	451 (56%)	678 (50%)

* Including Bus, CB Cost

Table 2: Overall Approval Status of UIG & UIDSSMT (under Transition Phase of JnNURM) (Data as on 21.03.2014)

Rs. in Crore

Particulars	UIG	UIDSSMT	Total
Approved Project Cost	14,677.13	12,504.80	27,181.93
ACA Committed	7,265.27	10,044.99	17,310.26
ACA Released	737.87	2,763.47	3,501.34
Projects Approved	112	330	442
States Covered	16	20	
Cities/Towns Covered	31	278	309

The sector-wise detail of projects sanctioned under Sub-Mission for Urban Infrastructure & Governance (UIG) of JNNURM are as under:

(Rs. in Lakh)

S. No.	Sector	No. of projects	Approved Cost	ACA Committed	ACA Released
1.	Drainage/Storm Water Drains	78	910348.37	372984.09	268319.01
2.	Water Supply	190	2319972.33	1137000.32	779249.30
3.	Sewerage	131	1750025.98	816243.19	487278.48
4.	Urban Renewal	10	46445.28	19249.12	9765.35
5.	Solid Waste Management	46	211021.81	112365.96	71991.56
6.	Development of Heritage Areas	7	22542.60	14412.02	7507.83
7.	Preservation of Water Bodies	4	11670.54	6861.22	5667.27
	Total	466	5272026.91	2479115.92	1629778.8

The sector-wise detail of projects sanctioned under Sub-Mission for Urban Infrastructure Development Scheme in Small and Medium Towns (UIDSSMT) of JNNURM are as under:

(Rs. in Lakh)

S. No.	Sector	No. of projects	Approved Cost	ACA Committed	ACA Released
1.	Drainage/ Storm Water Drains	79	164362.57	135609.38	65511.29
2.	Water Supply	573	1270421.46	1024460.59	726766.92
3.	Sewerage	129	536297.62	424898.03	218874.98
4.	Urban Renewal	9	3725.77	3174.35	2039.18
5.	Solid Waste Management	64	44664.03	36818.79	24740.93
6.	Development of Heritage Areas	1	1765.60	1412.48	706.24
7.	Preservation of Water Bodies	11	3611.94	2928.82	1651.46
	Total	866	2024848.99	1629302.44	1040291

Mission has completed its normal tenure on 31st March, 2012. The Government has extended the period for further 2 years till 31st March, 2014 only for completion of ongoing projects and reforms.

2.4.2 North Eastern Region Urban Development Programme (NERUDP)

The NERUDP is being implemented in the 5 states of North Eastern Region ó viz. Meghalaya, Mizoram, Nagaland, Sikkim and Tripura with the financial assistance of Asian Development Bank (ADB). This project covers technical and financial support to the local urban bodies in providing better basic urban services in (i) water, (ii) sewerage, and (iii) solid waste management sectors through infrastructure development in capital cities of these states at a total estimated cost of Rs.1371 crore spread over six years from 2009-10 to 2015-16. The project aims:-

- a. to improve quality of life of urban residents;
- b. to enhance urban productivity through improved infrastructure and services; and
- c. to build capacity for enhanced urban governance, finance and service delivery systems through institutional and financial reforms.

The project is being executed in three tranches as follows:-

Tranche	Total Cost	Tranche released (as on 28-03-2014)
Tranche 1 (2009-15)	Rs. 205.4 crore	113.08
Tranche 2 (2010-13)	Rs. 463.2 crore	331.45
Tranche 3 (2012-15)	Rs. 702.8 crore	

ADB is financing 70% of project cost as loan and rest 30% is to be borne by Govt. of India. In turn, GOI is releasing 90% of cost as grant and 10% as loan to the project states.

The scheme was approved by the Cabinet Committee on Infrastructure in February, 2009. ADB's loan of USD 30 million for Tranche-I became effective from 19th November, 2009. Another loan of USD 72 million has been negotiated on 21st November, 2011 for Tranche-II. Projects of Tranche-I are presently under execution.

2.4.3 Urban Infrastructure Development in Satellite towns/Counter Magnets of Million plus cities (UIDSST)

Ministry of Urban Development has launched a scheme for "Urban Infrastructure Development in Satellite towns / Counter Magnets of Million plus cities (UIDSST)". The objectives of this scheme amongst others are to develop urban infrastructure facilities such as water supply, sewerage, drainage and solid waste management etc. at satellite towns/counter magnets around seven mega-cities.

The details of the projects relating to Water Supply, Solid Waste Management, Storm Water Drainage and Sewerage sanctioned under these schemes are as under:

(Rs. In Lakh)

S. No.	Project	No. of projects	Sanctioned cost	GOI share	Fund released	Completed	Under progress
1	Solid Waste Management	5	7223.73	5779	1443.74	0	5
2	Water Supply	5	23526.41	18820.93	5594.67	0	5
3	Sewerage Scheme	6	332327.66	25370.77	7410.59	0	6

2.4.4 Scheme of 10% Lump-sum Provision Scheme for North Eastern Region including Sikkim

The scheme of 10% lump-sum provision scheme for North Eastern Region including Sikkim became operational from the financial year 2001-02. 10% of the Annual Plan Budget of the Ministry is earmarked for implementation of Projects/Schemes for the North-Eastern States including Sikkim.

The details of the projects relating to Water Supply, Solid Waste Management, Storm Water Drainage and Sewerage sanctioned under these schemes are as under:

(Rs. In Lakh)

S. No.	Project	No. of projects	Sanctioned cost	GOI share	Fund released	Completed	Under progress
1	Water Supply Scheme	22	22792.2	19418.73	8973.45	10	12
2	Solid Waste Management	5	1757.05	1670.52	1673.52	5	0
3	Storm Water Drainage	20	20461.33	19163.08	15447.65	13	7

2.4.5 Other Important Projects

(i) 100 MLD Sea Water Reverse Osmosis Desalination Plant at Nemmeli, Chennai

Drinking water supply sources of Chennai city are monsoon dependent and the city experiences water scarcity frequently. In order to provide the drinking water security to Chennai city, the water supply to Chennai city is made from Poondi, Cholavaram, Red Hills lake system, Veeranam source and Krishna/Telugu Ganga scheme and Desalination Plant at Minjur.

Government of India approved central assistance of Rs.871.246 crore towards construction of 100 MLD sea water desalination plant and external product water conveyance facilities in January, 2009 with the objective to augment 100 MLD water supply to the southern part of Chennai city as well as to meet the industrial demand. The plant has been commissioned in February, 2013 and supplying water to the beneficiaries.

During implementation of the project, it was decided by the State Government for laying a separate feeder main from Nemmeli plant to Porur to provide water supply to the western part of Chennai city particularly during drought situation due to failure of monsoon. The revised project cost has been estimated to the tune of Rs. 854.52 Crore. This work is in progress and likely to be completed shortly.

2.5 Training – Public Health Engineering (PHE)& capacity Building

PHE TRAINING PROGRAMME

The P.H.E. training programme was started in 1956 by the Ministry with the objective of providing training to in-service Engineers and Para-Engineering Staff of the various State Public Health Engineering Departments, Water Supply and Sewerage Boards, Urban Local Bodies etc.

The Ministry of Urban Development is running following three types of trainings:

- 1. Post Graduate (M.Tech/ME) Course:** The duration of course is 24 months (4 Semesters) in Public Health Engineering OR Environmental Engineering. Under this programme the Ministry is providing training to in-service Engineers and Para-Engineering Staff of the various State Public Health Engineering Departments, Water Supply and Sewerage Boards, Urban Local Bodies etc. in 12 recognized institutes.
- 2. Short Term Course (STC):** This programme has been tailored in such a way that Diploma Engineers working in State Public Health Engineering Departments/Water Supply and Sewerage Boards/Urban Local Bodies get adequate exposure towards the finer points of Public Health Engineering, so that they can apply the same in the field. The course is of three months duration. Financial support to the trainees/institutes in the form of stipend, tuition fee, expenses on field visits etc. is extended, thus sharing a major portion of the expenditure
- 3. Refresher Course:** Refresher Courses on various specializations are sponsored by the Ministry for the duration of 1 to 4 weeks and conducted through different academic, research & professional institutions and State Departments for the benefit of in-service Engineers & Para-Engineering Staff working in junior, middle & senior levels in various State Public Health Engineering Departments, Water Supply & Sewerage Boards & Urban Local Bodies etc. Financial support in the form of honorarium to lecturers, expenses on field visits, preparation of lecture materials etc. is extended to the institute conducting the training courses.

Number of personnel trained up to March, 2014 and in-service engineers expected to have trained in various training courses during 2013-14 are as under:

S. No.	Name of Course	Total upto 31.03.2014	During 2013-14 (upto 31.03.2014)	Total Cumulative
	P.G. Course in PHE	2638	14	2642
	Short Term Course in PHE	2594	Nil **	2594
	Refresher course in PHE	31352	675***	30697

**No short terms courses were conducted during this FY due to lack of Hostel accommodation in the two institutes conducting the courses;

*** Number of candidates trained up to March 2014.

The details are as follow:

1. Post Graduate Course in Public Health Engineering/Environmental Engineering

This training is imparted at the following academic institutions:-

1. All India Institute of Hygiene and Public Health, Kolkata
2. VeermataJeejabai Technological Institute, Mumbai
3. Anna University, Chennai
4. Visvesvaraya National Institute of Technology, Nagpur
5. Motilal Nehru National Institute of Technology, Allahabad
6. Shri Jayachamarajendra College of Engineering, Mysore
7. Sri G.S.Institute of Technology & Science, Indore
8. I.I.T., Powai, Mumbai
9. Malviya National Institute of Technology, Jaipur
10. I.I.T. Kharagpur, West Bengal
11. I.I.T. Delhi, New Delhi
12. Jawaharlal Nehru Technological University, Hyderabad

The duration of the Post Graduate Course is 24 months. Under the revised Financial Norms approved by the Ministry, Central support will be extended to meet the stipend @ Rs. 4000/- per month for 24 months for outstation trainees and tuition & examination fee for all trainees. In addition, contingency grant @ Rs. 2,500 /- per semester per candidate for 4 semesters is admissible and staff support for one Professor and one Assistant Professor is also extended to the Institutes.

2. SHORT TERM COURSE IN PUBLIC HEALTH ENGINEERING

This programme has been tailored in such a way that Diploma Engineers working in State Public Health Engineering Departments/Water Supply and Sewerage Boards/Urban Local Bodies get adequate exposure towards the finer points of Public Health Engineering, so that they can apply the same in the field. The course is of three months duration. Financial support in the form of stipend, tuition fee, expenses on field visits etc. is extended, thus sharing a major portion of the expenditure. At present the Short Term Course is not conducted in 2 Institutes viz. 1) Anna University, Chennai and 2) Shri Jayachamarajendra College of Engineering, Mysore due to non- availability of hostel facilities for the in-service candidates.

3. REFRESHER COURSE

Several Refresher Courses on various specializations are sponsored by the Ministry and conducted through different academic, research & professional institutions and State Departments for the benefit of in-service Engineers & Para-Engineering Staff working in junior, middle & senior levels in various State Public Health Engineering Departments, Water Supply & Sewerage Boards & Urban Local Bodies etc. Financial support in the form of honorarium to lecturers, expenses on field visits, preparation of lecture materials etc. is extended to the institute conducting the training courses.

Rs. 10.11 lakh has been released to the concerned institutes till December, 2012. Outstanding Utilization Certificates were obtained from some engineering colleges/institutes to facilitate further release of grants for ongoing training programmes.

The year-wise details of targets and achievements on various courses of the training programme are given below:

Sl. No.	Year	Post Graduate Course		Short Term Course		Refresher Courses	
		Target	Achievement	Target	Achievement	Target	Achievement
1.	1998-99	98	70	50	25	1400	1170
2.	1999-00	98	56	50	24	1400	1288
3.	2000-01	98	57	50	22	1400	1096
4.	2001-02	93	42	50	15	1300	1085
5.	2002-03	88	50	20	15	1200	1250
6.	2003-04	88	35	20	15	1200	1243
7.	2004-05	88	34	20	13	1200	1155
8.	2005-06	88	34	20	13	1200	1298
9.	2006-07	95	32	20	7	1200	1348
10.	2007-08	80	30	*	-	1200	1308
11.	2008-09	80	31	20	4	**	-

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12.	2009-10	80	30	20	17	1200	1140
13.	2010-11	80	28	Nil***	Nil	1000	895
14.	2011-12	80	20	Nil***	Nil	800	469
15.	2012-13	80	12	Nil	Nil	400	300
16.	2013-14	80	14	Nil	Nil	980@	675

*Short Term Courses were not conducted during the year 2007-08; ** Refresher Courses were not conducted during the year 2008-09; ***No Short Term Courses is being conducted during these Financial Years due to non-availability of hostel accommodation; @ Number of nominations received.

(i) Total outlay in the 10th& 11th Five Year Plans and proposal for 12th Five Year Plan for PHE Training Programme.

The actual allocation and expenditure for PHE Training programme for the 10th& 11th Five Year Plan is given below:

Year	Five Year Plan	Allocation	Allocation during five year plan	(Rs. in lakh) Actual Expenditure	Actual expenditure during Five Year Plan
2007-2008	11 th	*		102.00	
2008-2009		*		46.52	
2009-2010		*		20.83	
2010-2011		*		21.51	
2011-2012		200.00		18.60**	209.46
2012-2013	12 th	200.00		20.00**	
2013-2014		350.00***			

Chapter - 3

Present status of NMSH Scheme

3.1 National Mission on Sustainable Habitat (NMSH)

The National Mission on Sustainable Habitat is assigned to MOUD for implementation. The Mission seeks to promote sustainability of habitats through improvements in :

- (i) Energy efficiency in buildings,
- (ii) Urban planning,
- (iii) Improved management of solid and liquid waste including recycling and power generation,
- (iv) Modal shift towards public transport,
- (v) Conservation.

It also seeks to improve ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management and measures for improving advance warning systems for extreme weather events. The Mission is to be implemented through appropriate changes in the legal and regulatory framework, viz. Building Byelaws, Development Control and Regulation etc.; mainstreaming of climate change and sustainable development concerns in city planning through City Development Plans including those related to adaptation, promotion of modal shift in public transport through Comprehensive Mobility Plans, capacity building and outreach; and implementation of pilot projects.

The National Mission on Sustainable Habitat document had been approved by the Prime Minister's Council on Climate Change on 18th of June, 2010 and is available on MoUD website at link www.moud.gov.in.

3.1.1 Objectives

The NMSH seeks to promote sustainability of habitats through improvements in energy efficiency in buildings, urban planning, improved management of solid and liquid waste including recycling and power generation, modal shift towards public transport and conservation. It also seeks to improve ability of habitats to adapt to climate change by

improving resilience of infrastructure, community based disaster management and measures for improving advance warning systems for extreme weather events.

3.1.2 Steps to materialise the objectives

The first step towards implementation of the Mission is development of sustainable habitat standards which should include standards aimed at increasing energy efficiency in the residential and commercial sectors, urban transport, water supply and sewerage, urban planning and municipal waste. Adoption of benchmarks related to water supply, solid waste management, sewerage and storm water drainage will be promoted as integral component of sustainable habitat standards as it provides useful framework for addressing issues relating to both adaptation and mitigation apart from performance improvements in these sectors. The sustainable habitat standards to integrate standards related to energy performance of buildings, structural safety (against extreme events), energy efficient constructions, harmonizing of Energy Conservation Building Code (ECBC) norms with National Building Codes (NBC) and Environmental Impact Assessment (EIA) norms, mandatory rain water harvesting, integration of economic, transport, environment and risk planning with overall spatial and urban planning as well as regulations to discourage personal modes of transport and fuel efficiency standards. *These standards to be subsequently get integrated with the Building Byelaws, Development Control and Regulations and Motor Vehicle Act etc. to ensure that future developments are aligned in accordance with concerns related to climate change and harness win-win opportunities towards overall sustainable development.* The adoption of these standards into developmental activities shall be done through existing schemes like the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and other schemes of Government of India.

Comprehensive and holistic urban planning through City Development Plans that mainstream sustainable habitat standards will be a key component of implementation strategy of the Mission. The City Development Plans to cater to the requirements of both adaptation and mitigation and will include activities related to reducing vulnerabilities of communities against inadequate level of municipal services pertaining to water supply, waste water management, solid waste management, apart from integrated urban planning. Preparation of City Development Plans will be supported under JNNURM funds.

A set of complimentary actions comprising pilot projects related to green buildings, energy efficient construction material and technologies, recycle and reuse of solid and liquid waste, decentralized waste water management, use of low water technology, separation of grey water and black water, ecological sanitation, outreach activities aimed at raising awareness about economic and environmental benefits of energy efficiency and conservation, National network of key institutions working on issues relevant to the Mission, facilitating research and developmental activities exploring technological options for higher efficiency and lower cost green products, creation of dedicated website for wider dissemination of relevant

information, institution of awards for high performance buildings and systems and financial incentives for energy efficient constructions.

The lack of capacity for efficient urban planning has been taken into account while developing the Mission strategy and constitutes an important element of overall implementation framework. The capacity building measures will cater to needs related to increasing energy efficiency in residential and commercial sectors, urban transport, waste water management, solid waste management and adaptation as well as those related to development of projects related to clean development mechanism.

The key deliverables of the Mission thus include the following:-

- (e) development of sustainable habitat standards that lead to robust development strategies while simultaneously address climate change
- (f) preparation of city development plans that comprehensively address adaptation and mitigation concerns
- (g) complementary actions
- (h) capacity building for undertaking activities relevant to the Mission.

3.1.3 Plan Outlay

Total outlay Proposed for the NMSH scheme/programme during the 12th Plan is Rs. 1000 crore. The scheme objectives are to be achieved by end of 12th Plan viz. March 2017.

3.2 Expenditure Finance Committee (EFC) on NMSH

The Expenditure Finance Committee meeting had already been held on 10th February 2014 for appraisal of scheme, it was decided that *most of the activities proposed under NMSH could be funded under JNNURM and in case, any of the proposed activity is covered by the scheme/programme of other Ministry/ Department, the same could be funded by them in coordination with MoUDö.* As such, no separate fund allocation is sanctioned under NMSH by Competent Authority, as of now, for spending on envisaged activities. The activities envisaged and agreed in EFC are as under:

A.	Studies to be undertaken for development of broad guiding principles for integration in Urban Development Projects.	Significance of studies	Division to whom the task of implementation assigned as per NMSH EFC Minutes
1	Characterization of waste in 150 selected cities/towns including trend in Calorific value	<p>Characterization of Solid Waste is a specialized and time consuming task but, very much necessary for planning of Solid Waste Management System especially the transportation of different streams of waste and its processing. Over design and under design of project may lead to complicating the situation and cast on overall cleanliness and environment.</p> <p>In the present study, representative towns & cities shall be selected for waste characterization. Based on above, the majority of smaller towns may be able to design their waste management systems on these lines, if there is no major variation in the characteristic of town or city.</p> <p>Further, above study will be helpful to assess the changing trend of waste composition and calorific value of waste which may open the room for waste to energy plants in light of increased scarcity of land for waste processing and landfill site in urban areas.</p>	PHE/ CPHEEO
2	Development of Intensity-Duration-Frequency (IDF) Curves covering entire country for Urban Storm	Urban storm drainage system design is dependent on intensity of rainfall that has to be obtained on case to case basis from nearby Automatic Rain Gauge (ARG) stations. Since individual storms details like quantity of rainfall and its duration are not available in organized or digital form for these stations for last 25-30 years data. However, the	PHE/ CPHEEO

	<p>Drainage System Design.</p>	<p>same are available in recorded graph sheets ó one for each day (one stationø 25 years data may cover more than 50,000 data field on excel sheet). These graphs/information are not easily accessible to consultants/state officials, creating a lot of trouble in collecting the data from these stations and developing Intensity óDuration- Frequency (IDF) curve which is necessary for Storm Drainage System Design. The present process consumes a lot of time. Since problem of urban flooding and water logging is compounding in cities/towns, there is necessity to get the data collected and IDF curve drawn. Further, since ARG stations are limited below 100in number having requisite 25 to 30 years data, these graphs has to be extended to other adjoining/nearby districts by collecting the data from some of newly installed ARG stations for limited period and also co-relating the daily/ monthly/annual rainfall pattern to draw certain degree of similarity and accordingly to designate the IDF curve of nearby station for use in storm drainage system design in these towns not having ARG stations. Once the IDF curves covering all districts of country are drawn, it will be very useful in storm drainage design and expedite the whole process of project preparation and sanctioning and its implementation under programmes of Ministry like JNNURM/UIDSSMT/NERUDP etc.</p>	
<p>3</p>	<p>Preparation of treated waste water recycle/reuse master plan in two selected cities.</p>	<p>Recycle and reuse of waste water in urban area has been included as a Service Level Benchmark (SLB) parameter. All urban local bodies are to achieve this which will be helpful not only in saving the potable water to cover larger population but, it will also be helpful in providing additional nutrient rich water for the use of horticulture/agriculture and suitably treated water can be used in industrial establishments also.</p>	<p>PHE/ CPHEEO</p>

		Under JNNURM/UIDSSMT/NERUDP, a lot of DPRs are being prepared on sewerage system, however, if concept of recycle and reuse master plan is also integrated in planning and implementation of sewerage projects, it will help to suitably locate waste water treatments often in decentralized manner which can be used for non-potable uses, which otherwise is discharged to some water bodies which leads to its further pollution because of lack of adequate dilution capacity with water bodies. The study will help to reduce requirement of fresh water resources and help to cover additional urban population for their various domestic water supply needs and thus ensure water security.	
4	Study on assessment of optimal rate of domestic water supply in urban area	Rate of water supply keeps on varying from one country to other country and also from one city to other depending on the level of socio-economic development and also the culture of the people. Since rate of water supply in water supply and sewerage projects in the country is guided by the present norm of 150/135 LPCD for metro and other class-I cities respectively having sewerage facility. For optimum consumer satisfaction and also to explore possibility of reduced rate of water supply, the present study will be helpful to suitably incorporate in the manual on water supply & treatment which can go a long way in designing and improvement of water supply and sewerage infrastructure.	PHE/ CPHEEO
5	Development of road map for addressing plastic waste in the MSW stream in eco-sustainable manner.	Predominant presence of plastic bags and other plastic material in the solid waste stream creates a lot of problem for environment as they are not bio-degradable. Certain quality of plastic material can be recycled also for 2 to 3 times but later on the same has to be disposed in environmentally sustainable manner. In view of above, there is necessity to explore various available technologies/techniques for recycling/reuse of	PHE/ CPHEEO

		plastic material in environmentally sustainable manner. The present study can brought out the prevailing best practices in the country and abroad which will be helpful to handle the plastic waste in the country.	
B.	Replicable projects		
1	Pilot study in Nirman Bhawan premises on bringing in energy efficiency to be subsequently used / replicated in other Government offices.	Energy efficiency is in core of NMSH. Because of inefficient use of energy especially in commercial and office complexes a lot of power is wastage which otherwise can be used in productive use. Use of technology/ intelligent devices can save power consumption in office complexes. Also excess use /wastage of power is responsible for global warming/climate change.	CPWD
2	Demonstration Project in two small /medium towns for adopting online water quality & quantity monitoring and data storage facility.	Presently in most of the small and medium towns water quality testing at treatment plants are done manually and often in erratic manner. Quality of test done and its frequency is also poor. Data is maintained manually and often effective monitoring is missing. To overcome above and to improve monitoring water supply quality more effectively as well as for having online data storage advantage of technological development in the field need to be taken by getting installed demonstration projects with online monitoring and data storage facility.	JNNURM

3	<p>Demonstration of Smart and Compact City concept in a selected city and development of road map for integration of various aspects of Sustainable Smart City Concept in Urban Development.</p>	<p>A demonstration project in a part of city using intelligent devices on traffic control and information dissemination on the lines of some smart cities like Ottawa, Brisbane may open a new era in the country and depending on need the same can be replicated in other cities depending on need.</p> <p>The proposed study would help to develop a readily available road map for integration of sustainable smart city concept in various fields of urban development like transportation, energy efficiency in buildings as well as street lights and in basic services like water supply and sewerage, solid waste management and storm water drainage. It will also help to incorporate the above aspects of sustainable smart city concept at the planning level of project itself. The proposed study may be used as guiding material for various departments in state govts. and urban local bodies for developing and implementing infrastructure projects in urban areas.</p>	<p>JNNURM & UT</p>
C.	<p>Development of training material</p>		
1	<p>State-of -art training course material & code of practice on Urban planning with Sustainable Smart City concept for planners.</p>	<p>Sustainable Smart city concept in new to the country. As a part of promoting sustainable habitant concept the relevant aspects must be incorporated at planning stage itself. To promote this concept a State-of -art training course material & compact code of practice on Urban planning with Sustainable Smart City concept for planners need to be developed and such training need to be imparted to planning personnel.</p>	<p>TCPO</p>

2	State-of -art training course material & code of practice on Energy efficiency in buildings and commercial places incorporating GRIHA norms(TERI)/Energy Conservation Building Code(BEE)/National Building Code(BIS) and Sustainable Smart City concept for designers, planners and engineers.	Currently, three set of documents are available namely GRIHA norms (TERI)/Energy Conservation Building Code (BEE)/National Building Code (BIS). However, integrated norm including above and sustainable smart city concept is not available. To achieve the objectives of NMSH State-of -art training course material & code of practice on Energy efficiency in buildings and commercial places incorporating GRIHA norms (TERI)/Energy Conservation Building Code (BEE)/National Building Code (BIS) and Sustainable Smart City concept for designers, planners and engineers needs to be developed and such training needs to be imparted to designers, planners and engineers..	CPWD
3	State-of -art training course material & code of practice on Urban Transport with Sustainable Smart City concept for designers, planners and engineers.	As a part of promoting sustainable habitant concept the relevant aspects must be incorporated in respect of Urban transport as it is very crucial for economic development and is responsible for climate change also. To promote this concept a State-of -art training course material & compact code of practice on Urban Transport with Sustainable Smart City concept for designers, planners and engineers need to be developed and such training need to be imparted.	UT
4	State-of -art training course material & code of practice on integrated Solid	As a part of promoting sustainable habitant concept the relevant aspects must be incorporated in respect of Solid Waste Management as it is very crucial for economic development, well-being of people and is responsible for climate change	JNNURM (CBUD)

	Waste Management with Sustainable Smart City concept for designers, planners and engineers.	also. To promote this concept a State-of -art training course material & compact code of practice on Solid Waste Management with Sustainable Smart City concept for designers, planners and engineers need to be developed and such training need to be imparted.	
5	State-of -art training course material & code of practice on Water supply and sewerage services with Sustainable Smart City concept for designers, planners and engineers.	As a part of promoting sustainable habitant concept the relevant aspects must be incorporated in respect of Water supply and sewerage services as it is very crucial for economic development and well-being and is responsible for climate change also. To promote this concept a State-of -art training course material & compact code of practice on Water supply and sewerage services with Sustainable Smart City concept for designers, planners and engineers need to be developed and such training need to be imparted.	JNNURM (CBUD)
6	State-of -art training course material & code of practice on Storm Water Drainage Systems Management with Sustainable Smart City concept for designers, planners and engineers.	As a part of promoting sustainable habitant concept the relevant aspects must be incorporated in respect of Storm Water Drainage Systems Managements it is very crucial for economic development and well-being and is responsible for climate change also. To promote this concept a State-of -art training course material & compact code of practice on Storm Water Drainage Systems Management with Sustainable Smart City concept for designers, planners and engineers need to be developed and such training need to be imparted.	JNNURM (CBUD)
7	State-of -art training course material on sustainable	As a part of promoting sustainable habitant concept the aspects of urban lake conservation/ rejuvenation cannot be left out as it is very crucial for maintaining aesthetics of city and also can	JNNURM (CBUD)

	urban lake conservation/ rejuvenation and O & M integrating technological advancement for planners and engineers.	provide water security which is responsible for economic development and well-being and is responsible for climate change if not properly managed. To promote this concept a State-of -art training course material on urban lake conservation/ rejuvenation with Sustainable Smart City concept for designers, planners and engineers need to be developed and such training need to be imparted.	
D.	Setting up of an Innovation Centre for NMSH		
1	Setting up of two Innovation Centres for Information Communication Technology (ICT) for integrated Urban Development at NIUA and ASCI Hyderabad.	Two innovation centres may be useful in acting as knowledge centre in respect of Information Communication Technology (ICT) for Integrated Urban Development. These innovation centres will be repository of all relevant information / literature in the field and also will keep on bringing templates / advisories from time to time to guide the stakeholders like States/ ULBs etc. These innovation centres can also be used for getting guidance by States / ULBs in the innovative areas of NMSH like energy efficiency, green buildings, urban water and sanitation and urban planning etc.	JNNURM (CBUD)
E.	Advocacy on NMSH standards		
1	National Workshop on Dissemination of NMSH Standards and mainstreaming sustainability principles in Urban Development.	This will be helpful in incorporating NMSH standards in the rules and regulations at state levels.	PHE Division

F.	Sustainable Waste Reduction through creation of awareness and Training		
1	One International and one National Workshop for Policy Makers on Sustainable Waste Reduction Strategies and segregation of waste at source.	To effectively manage Solid Waste Management and treat waste as resource, the reduction of waste generation at source as well as segregation practices of waste at source will go a long way in improving the Solid Waste Management in the country.	JNNURM (CBUD)
2	State Level Training workshops on Waste Reduction Strategies and segregation of waste at source (one in each state and UT)	To effectively manage Solid Waste Management and treat waste as resource, the reduction of waste generation at source as well as segregation practices of waste at source will go a long way in improving the Solid Waste Management in the country.	JNNURM (CBUD)
3	ULB Level Training focusing on Waste Collectors/Recyclers formalisation including development of Short Audio Visual Documentary on Waste Segregation at Source and on WasteReduction Strategy to be circulated to ULBs.	Requisite know how and training focusing waste collector/recyclers and their formalization in place of individual rag pickers will organize the sector and requisite training can be imparted to segregate waste at source and take out recyclables which will not only add to wealth to the country but also the wet waste have better compost quality.	JNNURM (CBUD)

4.	Development of short clip for publicity through TV channels for creating awareness.	Solid waste over the years is becoming a menace in urban areas and cannot be solved alone through though the efforts of ULBs and we need to reach to masses through electronic media.	JNNURM (CBUD)
G.	Centre for Sustainable Habitat – NIUA		
1	Capacity Building and preparation of Sustainable Urban Habitat action plans	<p>This proposal is to take training further - leading to the preparation of Sustainable Urban Habitat Action Plans (SUHAPs) that address both issues of mitigation and adaptation. A SUHAP will ideally help ULBs/ parastatals/ utilities in integrating climate change issues in City Development Plans, City Sanitation Plans or any other existing frameworks of the ULB for all areas addressed under the National Mission on Sustainable Habitat.</p> <p>Along with the training roll-out, 28 cities (one city per state) will be identified in consultation with MoUD and States as Model Cities and a Sustainable Urban Habitat Action Plan (SUHAP) will be prepared for each city.</p> <p>Once the plans are prepared, the 28 cities will be supported in the plan implementation phase. The implementation will be undertaken by the respective ULB/parastatal/ utility at city and state level responsible for the plan preparation.</p> <p>It is further envisaged that once the process is completed for the initial 500-600 ULBs and 28 Model Plans, the RRoPs will be capacitated for further rolling out the trainings and preparing SUHAPs for the remaining urban areas in the states, as might be planned at the state level.</p>	JNNURM (CBUD)
2	Convergence of research work on sustainable habitat done by	The research conducted by the COEs addresses many aspects of the NMSH and with some coordination, can be made responsive to the NMSH in a comprehensive manner. NIUA will	JNNURM

	Centres of Excellence supported by the MoUD	convene a series of 4 workshops in 4 months with the COEs to brainstorm with the COEs and examine the convergence of their research work into a coherent and coordinated research agenda.	(CBUD)
3	Study of the effect of Density and Dispersal on the sustainability of city form	This study will address the urgent need for examining high-rise versus low-rise options for urban form from the perspective of efficient utilization of resources & infrastructure and economic & social sustainability. The study will examine the economies of scale that are inherent to dense urban development and related issues of land value and supply, the pressure on infrastructure and open space.	JNNURM (CBUD)
4	Study of mixed land use as a contributor to sustainable habitat	The traditional city in India and around the world has always adopted mixed land-use as a norm. However, modern town planning has separated this vital link. Renewed wisdom around the world is recognizing the folly of separating land uses, especially those that bear an organic link, eg. work space and housing. Segregation has put pressure on infrastructure and created urban sprawl. The study will examine the global thinking on the subject and prepare a policy brief that can inform the preparation of planning guidelines and policies that can synergize land uses for housing, commerce, transportation, recreation, etc. The methodology will use economic and physical modelling as tools.	JNNURM (CBUD)
5	International Conference on Integrated city planning ó the path to convergence	Sustainable habitat planning requires a radical shift from multiple planning tools ó master plans, city development plans, city mobility plans, sanitation plans, etc. ó towards an integrated and comprehensive planning paradigm. The conference will bring together leading practitioners and thinkers from India and abroad to deliberate upon the diverse and complex challenges posed by such a paradigm in the Indian context.	JNNURM (CBUD)

6	Conclave on Scenario-building for sustainable cities	The need for scenario building and understanding of the emerging urban system in India, as a precursor to long-term policy formulation. The complexity of the urban system requires a holistic understanding of in-situ urbanization, urban livelihoods and poverty, migration patterns, labour movement, economic drivers, resource optimization, etc. Sustainable habitat development in Indian cities will benefit greatly from the formulation of such scenarios. The two day conclave will follow the standard model, whereby leading thinkers from institutions like NIUA, ICRIER, NCAER, IIT, IIM, private sector leaders, the MoUD and the Planning Commission will converge at an off-site location to deliberate collectively on the urban system in India.	JNNURM (CBUD)
7	Baseline survey of India-wide experiments and success stories in smart city governance, planning and service delivery	The trend towards development of smart cities in India has begun, but it is limited to the introduction of ‘smartness’ in different aspects of urban infrastructure and management. In order to develop comprehensive and holistic ‘smartness’ in Indian cities, it is important to document and create a baseline of the technologies, the industry preparedness, the costs and availability, etc. of smart technologies, and the types of models and success stories that have been created in the country.	JNNURM (CBUD)
8	NIUA Conference on compact sustainable smart cities in partnership with NAREDCO	The dissemination of thinking about sustainable habitat can be effectively achieved through the association of real-estate developers, such as NAREDCO (National Real Estate Development Council). NIUA is partnering with NAREDCO in organizing a one-day conference on 30th August at the India Habitat Centre, New Delhi, on the subject ‘Compact Cities: the need for futuristic and sustainable habitats’. Industry leaders, practitioners and thinkers will be invited to this significant event. There will be four sessions dealing with economics, land pooling, spatial planning and smart cities.	JNNURM (CBUD)

9	Preparation of IEC and capacity building strategy for the promotion of segregation of solid waste at household level	One of the long-standing challenges to effective solid-waste management in Indian cities is segregation at source. The variety of types of waste forces the dumping of mixed waste in landfills. This puts a burden on the total system as it increases transportation costs and prevents the application of waste-to-wealth solutions. Creation of IEC material for use in public awareness would be a critical step towards introducing sustainable SWM strategies. However, this proves to be a weak link as very few organizations have the capacity to create their own material. This project envisages the creation of handbooks (for RWAs and individual households), posters (for schools, public places, neighbourhoods and commercial areas) and a short film. All materials will be created in English and translated into Hindi.	JNNURM (CBUD)
10	National workshop on design and implementation of decentralized solid waste management systems in Indian cities	SWM has become a looming municipal problem. The environmental damages caused by landfill, the lack of land for such disposal, and the growing costs of collection and transportation of waste, have resulted in a chaotic scenario. Decentralization of SWM is the only solution available; however, the management techniques and technology options are not keeping pace with the growth in the phenomenon itself. A collation of knowledge on the subject and the deliberation of the problems and challenges will assist in the preparation of sustainable strategies. This requires the collaboration of specialists, institutions and organizations across the social spectrum.	JNNURM (CBUD)
11	Model curricula and training modules for state urban governance institutes	A number of states have reported their intention to create new institutes for training of municipal cadres. These institutes will require curricula that account for the complexity of the urban phenomenon in each particular state and the needs of the sector, depending on the demography, geography, level of urban development, socio-economic profile, etc. NIUA has been gathering	JNNURM (CBUD)

		knowledge about urbanization and municipal governance in the states for more than two decades. NIUA can apply its acquired knowledge to the task of preparing model curricula that can kick-start the process of training in the states. This would be done in consultation with the state Administrative Training Institutes and other stakeholders.	
12	National outreach programme for creating consumer awareness programmes focused on economic and environmental benefits from energy efficiency and green buildings dissemination of programmes	The project will be helpful in bringing in energy efficiency and would be beneficial on economic and environmental aspects.	JNNURM (CBUD)
H.	Miscellaneous / Other related Projects		
1	Create a dedicated website with information on building codes green building codes, green building benefits and technical advice.	Important for reaching to masses with information on building codes, green building codes, green building benefits and technical advice	CPWD
2	Award for incentivisation of efficient lighting systems, particularly street lighting.	This will help to bring in competition among various ULBs and also important for dissemination of best practices in the sector.	CPWD

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3	Demonstration project for recycling of construction waste with decentralized approach.	Construction waste is consuming landfill site at very fast rate and with development of techniques for recycling of construction waste, the problem of landfill scarcity can be solved as well as helpful in resource recycling.	CPWD
4	Creating public awareness in the field of urban transport	To bring in discipline and improvement in urban transport and for propagating public transport reaching to masses in this respect is important.	UT
5	Demonstration project for improving access to goods and services through an integrated transport plan.	With quick access to services and goods, it will be helpful in overall development of the country.	UT
6	Demonstration project for integrating inter-city road passenger transport with urban transport systems.	This will be helpful in saving net time of commuting and also buying ticket at multiple places.	UT
7	Demonstration projects for promotion of low-water use toilets and ecological sanitation approaches where nutrients are safely recycled into productive agriculture	The measure will be helpful in reducing water consumption in urban areas.	CPWD
8	Demonstration projects for promoting use of treated waste water for artificial recharge of aquifers	This will be helpful in recharge of ground water and will help in checking the depletion of ground water table.	JNNURM (CBUD)

9	Demonstration projects for decentralized waste management (sewerage & solid waste) systems for community housing complexes, buildings.	The initiative will help to process waste locally and thus save the cost of transportation and also the processed material can be used locally.	JNNURM (CBUD)
10	Pilot project for segregation at the house-hold level of black and grey water so that the former can be recycled for fertilizer and latter for toilets.	The initiative is helpful in bringing down requirement of fresh water in urban areas.	JNNURM (CBUD)
11	Awareness programme for segregation and storing bio-degradable and non-biodegradable waste.	Segregation of waste at source will add value to the different streams of waste and will help waste management effectively.	JNNURM (CBUD)
12	Augmentation of capacity for implementation and enforcement of various measures such as façade improvement, orientation, etc.	The initiative may be helpful in improving esthetics of buildings and also reduce electricity consumption.	CPWD
13	Strengthening institutional and technical capacity of all ULBs for recycling and reuse of waste water for non-potable uses.	The institutional and technical capacity will help development of projects and also its maintenance and will be helpful in reducing requirement of fresh water sources.	JNNURM (CBUD)

14	Revision of Rapid Vulnerability Assessment methodology incorporating SLBs with Analysis of 40 cities and development of toolkit for Rapid Vulnerability Assessment and Consultant Training Workshops	Help to include Rapid Vulnerability Assessment in SLB.	JNNURM (CBUD)
15	Methodology Development of City analytical Reports on adaptation prioritization and identifying of cost effective options for 10 cities including Stakeholders consultations/ workshop	The study will be helpful in adaptation due to climate change.	JNNURM (CBUD)
16	Dissemination and extension activities resources portal e-newsletter and webinars	The activity will be helpful in dissemination of information related to Rapid Vulnerability Assessment	JNNURM (CBUD)
17	Climate change impact on urban water resources of state capitals of North East and preparation of adaptation policies	The study will help to cope up with climate change and also suggest adaptation measures.	JNNURM (CBUD)
18	Providing technical support and	Above activities will be helpful in effectively dealing with problems related to urban	JNNURM (CBUD)

	<p>conducting awareness programme for the following:</p> <p>(i) Detail planning of the pilot project considering all implementation complexities.</p> <p>(ii) Providing technical support in designing different EMPs and in Drainage Planning of the pilot project area which is a hilly urban watershed.</p> <p>(iii) Conduct awareness meetings/ campaigning for stakeholders and people of that locality to have their cooperation in implementation.</p> <p>(iv) To conduct awareness campaigning among the school and college children and women so that life concept can be built in the mind of new generation.</p> <p>(v) The center will also work towards empanelling consultants</p>	<p>planning, drainage system and for mass awareness.</p>	
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NMSH : Adaptation & Mitigation Measures in Water Supply & Sanitation Sub-Sector

19	Climate change impacts on urban water resources of state capitals of North East and mitigation strategies.	The study will help to cope up with climate change and also suggest mitigation measures.	JNNURM (CBUD)
20	Additional provision of Rs. 20 crore has been kept for remaining Five Year Plan period that will be utilized towards further innovative studies/research/trainings/workshops that may arise during the course of implementation of NMSH being a new and advanced concept	The provision of Rs. 20 crore has been kept as an additional cushioning for taking up activities related to innovative ideas/studies that may come up during the course 12 th Five Year Plan and will be necessary for the sector.	JNNURM (CBUD)

Chapter -4

Outcome and Way Forward

4.1 Expected Outcome

The impact of various steps undertaken under NMSH and various programmes of Ministry has resulted in achieving better “**Resource Efficiency**” and “**Energy Efficiency**” and leading to low CO₂ emissions and thus mitigating climate change. Mitigation measures are through initiatives on improved water supply and reduction in losses, efficient pumping, waste (liquid and solid) processing and recycling, less dependence of fossil fuel and use of clean technologies that is fuel efficient. The initiatives undertaken have its impact on adaptation measures also like urban people facing reduced vulnerability to flooding etc. While quantification of resource efficiency is a matter of research, the energy efficiency is estimated in form of equivalent reduction in Green House Emission(GHG).

4.2 Reduction in Green House Gas Emission

The efforts of Ministry by way of sanctioning various projects in the field of water supply, sewerage and solid waste has resulted in developing the total equivalent CO₂ emission reduction capacity of **21391,56,528 tCO₂e(2.14 billion tCO₂e)**as worked out below.

4.2.1 Water Supply

Consequent to sanction/implementation of water supply projects under JNNURM, the expected reduction in CO₂ is assessed at **497,66,698tCO₂** per annum in intermediate year as per calculation given below for UIG and UIDSSMT.

UIG

Sl. No.	Capacity Augmented (MLD) (Intermediate year)	Per MLD CO ₂ reduction due to efficient designing and pumping (tCO ₂ e)	Total CO ₂ emission reduced per day (tCO ₂ e)	Total CO ₂ emission reduced per annum (tCO ₂ e)
1	9700.84	10*	97008.4	35408066

*based on UK environment agency Science Report 6 SC070010 and suitable assumptions in Indian condition.

UIDSSMT

Sl. No.	Capacity Augmented (MLD) (Intermediate year)	Per MLD CO2 reduction due to efficient designing and pumping (tCO ₂ e)	Total CO2 emission reduced (tCO ₂ e)	Total CO2 emission reduced per annum (tCO ₂ e)
1	3284.60*	10	32846	11988790

*based on suitable extrapolation

Total CO₂ reduction per annum is = 35408066 +11988790 = 47396856 tCO₂e.

On adding 5% contribution (approx.) towards other programme projects after 2007-08 onwards, the total CO₂ reduction per annum works out to **497,66,698 tCO₂e**.

The reduction in CO₂ is due to improvement in pumping efficiency in extraction of water from source, its transmission, treatment and at household level. Over and above, the saving in CO₂ reduction is due to reduction in leakages and metering of connections etc. Its additional impact is in form of improved water security to people, increased coverage, less contamination of water supply and improved health of people and consequent productivity.

4.2.2 Sewerage

Consequent to sanction/implementation of Sewerage projects under JNNURM, the expected reduction in CO₂ is assessed at **5677,40,162 tCO₂** per annum in intermediate year as per calculation given below for UIG and UIDSSMT.

UIG

Sl. No.	Capacity Augmented (MLD) (Intermediate year)	Per MLD CO2 reduction due to efficient designing and pumping (tCO ₂ e)	Total CO2 emission reduced per day (tCO ₂ e)	Total CO2 emission reduced per annum (tCO ₂ e)
1	6116.45	250	1529112.5	558126062.5

UIDSSMT

Sl. No.	Capacity Augmented (MLD) (Intermediate year)	Per MLD CO2 reduction due to efficient designing and pumping (tCO ₂ e)	Total CO2 emission reduced per day (tCO ₂ e)	Total CO2 emission reduced per annum (tCO ₂ e)
1	1095.36	250	26340	9614100

(Total CO₂ reduction per annum is = 558126062.5 +9614100 = **5677,40,162.5 tCO₂e**, as contribution towards projects other than JNNURM are negligible)

The reduction in CO₂ emission is due to improvement in pumping efficiency, its transmission, treatment/processing and capturing Methane and other biodegradable material. Its additional impact is in form of improved water security to people by way of recycle and reuse and checking pollution of fresh water sources and also ground water, reduced environmental degradation, reduced contamination of water supply and improved health of people and consequent productivity.

4.2.3 Solid Waste Management

Consequent to sanction/implementation of Sewerage projects under JNNURM, the expected reduction in CO₂ is assessed at **15216,49,668tCO₂** per annum in intermediate year as per calculation given below for UIG.

UIG				
Sl. No.	Capacity Augmented (TPD) (Intermediate year)	Per TPD CO ₂ reduction due to efficient designing and pumping (tCO ₂ e/TPD)	Total CO ₂ emission reduced per day (tCO ₂ e)	Total CO ₂ emission reduced per annum (tCO ₂ e)
1	37899.12	100	3789912	13833,17,880

Total CO₂ emission reduction including 10% (approx.) of UIG for UIDSSMT and others is 1521649668 tCO₂e.

The reduction in CO₂ emission is due to treatment/processing of waste and other biodegradable material and capturing methane and other green house gas emissions. Its additional impact is in form of improved resource security to people by way of recycle and reuse and checking pollution of environmental and its degradation and improved health of people and consequent productivity.

4.2.4 Total reduction in GHG

By the way of project implementation/sanctioning, ministry has developed the capacity of total tCO₂e emission reduction under JNNURM projects and others after 2007-08 as below;

Water supply	-	497,66,698
Sewerage	-	5677,40,162
Solid waste	-	15216,49,668
<hr style="border-top: 1px dashed black;"/>		
Sub-Total	=	21391,56,528tCO₂e

Total GHG emission reduction capacity per annum developed is **2.14 billiontCO₂e**.

4.3 Way forward

Dedicated innovative proposals/demonstration projects/awareness creation activities received from autonomous organizations, IITs and states etc. will be considered for sanction by the Sanctioning Committee after appraisal by respective technical organizations like CPHEEO, CPWD, TCPO etc. and sanction will be made after fulfillment of all conditions under NMSH including desired outcomes. It will also disseminate the standards, policies, success stories and findings and work on integration of the Sustainable Habitat Standards and findings from the innovative studies / demonstration projects envisaged in the EFC with relevant and regulations. It will also be oriented to develop a set of complementary actions to mitigate climate change in the urban areas. Capacity building measures catering to needs related to sustainable urban development, will also be on top priority.