

SUNYA – Towards Zero Waste in South Asia

CASE STUDY

Impact of Solid Waste Disposal on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) estimates that the global annual emissions from solid waste disposed in landfills is roughly around 20-40 million tonnes of methane. This contributes almost 5-20% of the anthropogenic methane that comprises 1-4% of the total greenhouse gas (GHG) emissions in the world¹. Disposal of waste is the fourth largest contributor to GHG emissions in India after energy, industrial processes and product use (IPPU) and agriculture. Of the total methane emissions of 20,053.54 Gg in India in 2014, the emissions from waste disposal alone comprised almost 7%². Therefore, initiatives in the solid waste management sector could play a substantial role in reducing emissions to achieve India's commitment to cut the emission intensity of its GDP by 33-35% by 2030 from 2005 levels.

Integrated Solid Waste Management Approach

The manual for waste management by CPHEEO has recommended an integrated solid waste management (ISWM) approach that focuses on minimising waste generation and energy and material recovery from waste before disposal. Reduced waste in landfills will result in reduced GHG emissions. The ISWM should be

implemented in cities in a planned manner, using a multi-pronged approach with centralised and decentralised methods. SUNYA is one such decentralised model of

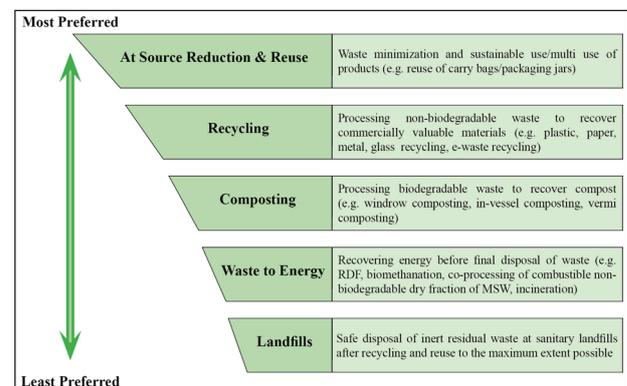


Figure 1: Hierarchy of waste management in ISWM

waste management that has been implemented in several cities in South Asia with a positive impact on climate change mitigation and adaptation.

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Approach

The SUNYA model is a decentralised waste management approach that focuses on initiatives at different levels of waste management, such as at-source reduction of waste,

1. https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/5_1_CH4_Solid_Waste.pdf, Pg: 420

2. <https://unfccc.int/sites/default/files/resource/INDIA%20SECOND%20BUR%20High%20Res.pdf>, Pg:99

recycling and reuse, segregated collection and in-situ treatment for locality or ward-level management of waste. Its primary objective is to reduce the waste that reaches the landfills by adopting the 3R principles of Reduce, Reuse and Recycle. The wet waste is processed in situ and recyclables are recovered from dry waste. Only those that cannot be processed or recycled in this decentralised system are sent to the centralised facilities or landfills.

Some of the co-benefits of the SUNYA model are:

Resilient waste management system: The SUNYA model provides a resilient system of waste management by promoting multiple decentralised paths or nodes that will continue functioning, even if one pathway fails when performance is critical. Decentralised models provide back-up systems that are flexible and diverse for service delivery and avoid a total collapse of the system in case of sudden shocks.

GHG emission mitigation: The in-situ and decentralised processing approach of SUNYA results in minimal waste reaching the landfill, reducing GHG emissions. The impact is supplemented by lowered emissions from allied activities of waste management such as transport of waste or burning of waste.

Enhanced efficiency of waste management system: The decentralised approach of SUNYA enhances the efficiency of collection, transport, processing and disposal of waste since the solutions are developed to address identified gaps in the existing systems.

Community engagement: The SUNYA model focuses on capacity development of all involved stakeholders, including waste management service providers as well as waste generators, resulting in an informed society that strives to minimise waste generation and indiscriminate littering. The continuous community engagement process in the SUNYA model encourages the sustainability of the system. This also helps in easy replication and scaling-up of the project.

Socio-economic upliftment: The SUNYA model provides opportunities to waste collectors to supplement their existing income through sale of recyclables from segregated dry waste. It promotes inclusivity by including

the informal sector in the formal waste management system. The segregated collection of hazardous waste fractions and the usage of Personal Protective Equipment (PPEs) results in better handling of waste by sanitary workers.

Improved quality of life: The reduced littering of surface water systems, lesser pollution of air quality, lesser degradation of soil quality and even the prevented blockage of open drain systems results in improved quality of life in the city. Public health improves because of reduced cases of waterlogging and reduced breeding grounds for pathogens, which in turn reduces the chances of epidemics.

Better resource recovery: The segregated collection system provides a better chance of recovering valuable materials from dry waste for reuse, recycling and processing. The concentrated wet waste fraction is also a good feed for composting and energy recovery, compared to fractions recovered from mixed waste.

SUNYA – Case Studies

The implementation of the SUNYA model has transformed the waste management system in the cities of Coimbatore (India), Dhaka (Bangladesh) & Udaipur (India). SUNYA projects have also been successfully implemented in other South Asian cities, including Hetuada (Nepal), Matale (Sri Lanka), Phentsholing (Bhutan), and Siliguri (India), besides Shimla (India) and Tansen (Nepal).

The SUNYA concept was developed through a project supported by European Union, that was carried out in 7 cities in South Asia. This was then extended to other cities through financial support from other donors such as Swiss Agency for Development and Cooperation, UNEP and IGES.

The major outcomes/achievements of the implementation of SUNYA in the cities are mentioned below.

Governance/Institutional

A zero-waste action plan for waste management has been developed as part of the initiative in several project cities.

- In the Coimbatore City Municipal Corporation (CCMC), the action plan has been approved by the city council for implementation.

It has facilitated the implementation of efficient door-to-door segregated collection, leading to minimised littering in project cities. In collaboration with city officials, bins have been distributed to waste generators for segregated waste storage. Personal Protective Equipment (PPEs) and other tools have been distributed to sanitary workers.

- In CCMC, 89 street bins were removed without any negative impact on the cleanliness of the area because of efficient door-to-door collection services.

It has facilitated decentralised processing of waste at ward level, resulting in reduced transportation of waste to secondary collection points and landfills.

- In-situ pit composting and barrel composting in schools and government offices in Matale Municipal Council (MMC) has been implemented. Sujata School has become a zero-waste school.

- More than 10TPD of wet waste was processed in decentralised facilities in MMC.
- The segregated collection of garden waste and composting in decentralised facilities in the pilot area in CCMC has been institutionalised.

Infrastructural

Infrastructure for in-situ waste processing and segregated waste collection has been installed and implemented in the project cities.

- In CCMC, household-level composting pots have been distributed to 10 families. In addition, 15 push carts have been issued to sanitary workers with four bins to facilitate segregated primary collection. As part of the SUNYA initiative, a biomethanation plant of 1.5 TPD and an Organic Waste Converter (OWC) was installed in Ward No.23.
- 10 PET bottle collection facilities were installed in Hetauda Municipality.



Figure 2: Compost prepared and packed in decentralised compost pits in MEC and segregated waste collection in Tansen Municipality



Figure 3: PET bottle collection facility in Hetuuda Municipality and roof top garden in Kitchen market in Dhaka

- A biomethanation plant of 2 TPD was installed in the Udaipur Municipal Corporation (UMC).
- A compost plant of 1 TPD was installed in the Siliguri Municipal Corporation (SMC).
- In Dhaka North City Corporation (DNCC), 20-litre collection bins were installed in tourist spots and 10 duel bins were installed in commercial areas for segregated waste collection. A rotary composter was installed in Kitchen market in DNCC to facilitate decentralised waste processing. A roof-top garden was developed in the Kitchen market, where organic wet waste from the market was used as manure.
- Jute/cloth bags were distributed in Tansen Municipality to reduce generation of single-use plastics and to promote the habit of carrying cloth bags. Composting pits and vermicomposting worms were distributed in the city to implement decentralised wet waste processing.

Socio-Economic

The capacity building of multiple stakeholders to implement a segregated collection system has led an increment of recovery of valuable materials from waste in the project areas, resulting in reduced waste generation as well as increased revenues (supplementary income) to the sanitary workers.

- In CCMC, more than INR 5 lakhs were raised with the sale of recyclables by sanitary workers.
- The sanitary workers in Hetauda Municipality made additional income by segregated collection and sale of plastics to recycling units.

Decentralised waste treatment has resulted in reduced operational & maintenance costs of waste management systems.

- Decentralised waste treatment in CCMC has reduced the consumption of diesel for transportation of waste, saving an average about 3150 litres of diesel and INR 1.55 lakhs per month.

A series of IEC activities were conducted in project cities that resulted in community involvement & support in critical project activities, including segregated waste collection and prevention of public littering.

- A mega IEC event was conducted in the CCMC that set a Guinness world record for the largest recycling lesson attended by 12,994 participants.
- 70% households initiated in-situ wet waste processing in Tansen Municipality.
- Mass cleaning campaigns were organised in Phuentsholing, which aimed at generating awareness on the difficulties of waste collection and segregation in the event of rampant littering.
- The Shimla Environment, Heritage Conservation & Beautification (SEHB) Society was formed under the aegis of the Municipal Corporation of Shimla (MCS). It has conducted training in and has been involved in door-to-door segregated waste collection.

More efficient and decentralised waste management systems resulted in reduced blocking of open drains and



Figure 4: IEC activities in Siliguri and Udaipur

minimised littering of open water resources in the project cities.

- Fewer complaints of blocking of drains were registered in the DNCC project area.

GHG emission mitigation

The pilot-level initiatives alone have resulted in reduction of GHG emissions in the project cities.

- The biomethanation facility installed in the CCMC has a GHG emission reduction potential of 1771 tonnes of CO₂e per annum.
- The biomethanation facility installed in the UMC has a GHG emission reduction potential of 1437 tonnes of CO₂e per annum.
- The compost facility installed in the SMC has a GHG emission reduction potential of 2500 tonnes of CO₂e per annum.

Lessons Learnt and Success Factors of SUNYA Initiatives in South Asian Cities

- Community mobilisation: Community support is a critical component in the successful implementation of a SUNYA system. Since multiple stakeholders, including waste generators and informal rag pickers, have an important role to play in the functioning of

the system, proper planning and implementation of a custom-designed community mobilisation model is important. Recognising and using local champions who can influence the implementation of the process increases the ownership and sustainability of the system.

- Efficient contract management: In case it uses external service providers for collection and decentralised processing, then the city needs to undertake proper contracting and management of public private partnerships. The selection of a competent contractor, developing a transparent and implementable contract and monitoring/evaluation of the execution activities are important factors for successful implementation.
- Supporting policies: The state/national policy on waste management is another important factor that affects the successful implementation of a SUNYA model. For example in India, the Solid Waste Management Rules 2016 emphasises decentralised processing to minimise transportation costs and environmental impacts. It also states that the local governments need to allocate space for decentralised waste management and promote in-situ wet waste processing facilities in markets, gated communities and bulk waste generators.

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