

# Risk Resilience : Building for the Future

Planning for Sustainable Solid Waste Management

# Coastal Cities and its Challenges

- Global population is concentrated in low-lying coastal zones
- 2% of earth houses 13% of its population, a proportion which is rapidly increasing (McGranahan et al, 2007: *The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones*).
- Coastal environmental features such as mangroves, estuaries, beaches, bays coupled with population growth, tourism and pressure from commercial projects (ports, harbours, offshore oil and gas exploration).
- Lack of appropriate and sufficient land for landfill sites, their proximity to marine environment with its fragile ecosystems.
- Climate change and global warming induced more frequent extreme weather conditions has complicated the situation further.

# SWM and Coastal Areas

- [Earth Summit of 1992](#) emphasised the importance of protecting oceans, seas and coastal areas by reducing pollution from solid waste.
- It envisioned a serious international commitment to improving SWM, minimising waste generation, maximising reuse and recycling, promoting adequate disposal and treatment, and expanding waste services.
- A worldwide crisis in urban areas due to increase in urban waste and increased consumption of disposable items and the inappropriate ways of collection and disposal of waste ([UNHABITAT, 2010](#)).
- SWM is one of the most challenging problems faced by the world's municipalities.
- In coastal zones, this leads to proliferation of marine litter, which causes harm to ecosystem and marine life, and impacts economic and recreational activities in the marine environment, like fishing, tourism and navigation.
- Coastal cities have a responsibility to avoid generating marine litter, by implementing and conducting appropriate waste management procedures ([UNEP, 2011](#)).

# Landfill Waste and Methane Emissions: An Environmental Risk

1. Landfill waste contributes to global methane emissions, accounting for approximately 11% of the total.
2. The World Bank predicts a projected increase of about 70% in landfill waste and associated methane emissions by 2050, driven by the growing global population.
3. Methane is a potent greenhouse gas, with 80 times more warming potential than CO<sub>2</sub> over a 20-year period.
4. Taking immediate action to reduce methane emissions can have a significant and rapid impact on climate change.

# Satellite study findings (Science Journal)

High-resolution satellite images captured in 2020 identified upwind landfills as significant sources of methane emissions in the following locations:

- Buenos Aires, Argentina
- New Delhi and Mumbai, India
- Lahore, Pakistan

## 2. Landfill emissions in Mumbai:

The study's findings reveal that a landfill in Mumbai emitted approximately 9.8 tonnes of methane per hour or 85,000 tonnes per year.

## 3. Landfill emissions in Buenos Aires:

The Buenos Aires landfill accounted for roughly 250,000 tonnes of methane emissions annually, equivalent to half of the city's total methane emissions.

## Study found air in and around BKC school polluted with landfill gas: Parents (TOI, 27<sup>TH</sup> May 2023)

- According to the study, gases such as SO<sub>x</sub>, NO<sub>x</sub>, and formaldehyde, have been observed in critically high concentrations during different times of the day. “The public sensor in BKC shows that these pollutants were well within range- SO<sub>x</sub> at 4 parts per billion (ppb) and NO<sub>x</sub> at 8ppb. AIS (Ascend International School) had SO<sub>x</sub> at 87ppb and NO<sub>x</sub> at 97 ppb. Acceptable levels are under 15ppb for SO<sub>x</sub> and 22ppb for NO<sub>x</sub>,” said the report

# Waste Generation in India

- Waste generation has tremendously increased in the past decade and reached 62 mt each year in India. Out of 62 mt of waste, only 43 mt are collected annually and only 28% of it was treated. The rest is dumped in landfills.
- India will, in a couple of decades, generate nearly thrice the waste it currently does – “165 mt by 2030 and 436 mt by 2050”, according to a June 2021 [report](#) by the Ministry of Housing and Urban Affairs. Only [22%-28%](#) of the waste now collected is processed or treated.
- In low-income countries the problem is of waste mismanagement — over 90% of waste is not disposed of correctly, leading to higher emissions and risk of disaster ([World Bank’s ‘What A Waste 2.0’ report, 2018](#)).

# SWM Components

## Collection

- Coverage should be 100% on daily basis
- Segregation at source
- Reduction in quantum of waste at generator's level
- Reuse and Recycle (3R principle)

## Transportation

- In separate vehicles for segregated waste
- Timely and regularly
- In closed containers



# SWM Components

## Treatment

- Composting: aerobic and anaerobic
- Waste to Energy
- Bioreactor Landfill
- RDF
- Construction and Debris waste recycling
- Medical Waste

## Disposal

- Scientific, sanitary landfills
- Away from water bodies
- Inert only

# Why have we failed so far?

- **Priority:** Waste is ULBs' problem alone,
- **Capability:** Lack of competency at ULBs level as well as lack of competency in private sector: dirty work
- **Knowledge:** Lack of awareness about the harm unscientific disposal of waste can create
- **Legal loopholes:** at every stage of waste management
- **Myths:** Concepts like 'Waste is wealth' and hence waste processing is profitable business.
- **Lack of Modernisation:** leading to non adoption of mechanisation and other scientific methods
- **Lack of data:** about everything collection, treatment, disposal

# Conclusion

- Economic and social cost of wild dumping is too high for any society.
- Implementing **Zero Waste strategy** is precondition to **Net Zero goal**.
- Proper accounting of all waste generated in the municipal limits
- Recycling after proper segregation including composting of biodegradables, and
- Disposal in sanitary engineered landfill.
- State support is a must.