SOLID WASTE MANAGEMENT

PROBLEM AND SOLUTION

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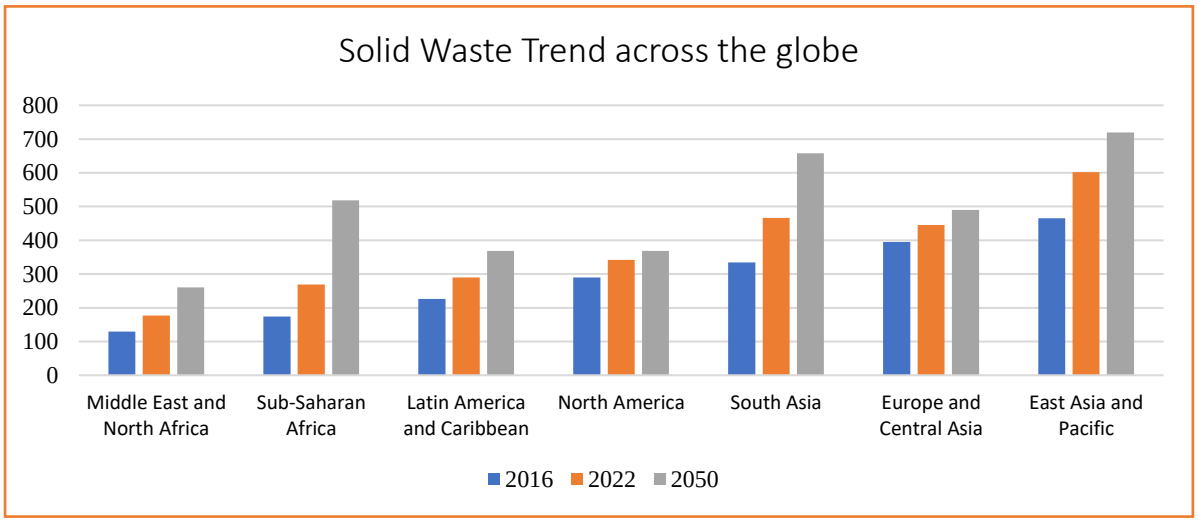
PROBLEM

About 2 billion tonnes of *Municipal Solid Waste* (MSW) is generated every year around the world, which is equal to total number of known galaxies! India alone has population of about 1.25 million, which produces roughly 150,000 tonnes of solid waste per day, which amounts to 62 million tonnes of MSW per year, about 70% (~ 43 million tonnes) of which is collected, of which, less than 30% (~ 12 million tonnes) is treated, and rest (~ 31 million tonnes) is dumped in landfill sites.

According to World Bank, India daily waste generation will surpass 377,000 tonnes by 2025

CONSEQUNECES



With ever raising population, solid waste generation is increasing, which coupled with improper *Solid Waste Management* (SWM) leads to a series of consequences

- Improper SWM costs 10 times more than healthcare, decreasing productivity
- Non-adequate collection to improper disposal causes air, water and soil pollution
- Increasing need for landfill sites (which is NOT a solution). Open and unsanitary landfills cause contamination of drinking water and spread of infections and diseases
- Uncollected waste remains littered across the city, leading to environmental and marine pollution, blocking drains, causing dengue, malaria etc

SOLUTION

An effective 5-step protocol for sustainable SWM in a given area is proposed below

STEP 1: Understanding Demography

- Evaluate and localize waste generation sources in the entire area.

- Classify the area into regions based on density of waste generation as
    - High density regions
    - Medium density regions
    - Low density regions

STEP 2: Statistical Analysis (GIS Maps)

Create GIS (Geographical Information System) maps for each type of region (as in Step-1), with modifiable parameters like…

- Land Use
- Demography (births, deaths, diseases etc)
- Infrastructure
- Environment

STEP 3: Waste Characterisation

- Collected waste is screened on-site via Rotary Trommels (in mobile vehicular units) based on size
- Screened waste is categorised based on detailed physical and chemical composition
    - Physical Analysis: thermal, mechanical and physical properties
    - Chemical Analysis: elemental composition of waste (like Carbon, Oxygen etc)
    - Stability and Elution test: reveals green house gas potential and leaching property

These Waste Characterisation Manuals gives us a LOT OF DATA to work with…

STEP 4: Data Analysis (using dynamic software's)

Data Analysis allows us to…

- Design efficient collection systems based on compiled demographical and waste generation density data for a given region, employing on-site waste characterisation units
- Estimate cost, fuel consumption, man power requirements, vehicles needed and other parameters
- List possible collection scenarios and future predictions

STEP 5: Treatment Plant

For a given region with certain demography, one of possible treatment options is considered

- Composting plant
- Anaerobic Digestion
- Mechanical Biological Treatment
- Thermal Pyrolysis Treatment

Detailed Data Analysis allows prediction of infrastructural requirements for the plant (cost, electricity, water, infrastructure etc)

RESULT

Waste characterisation study ensures long-lasting solution for SWM, and working of treatment plant for long duration of time.