

# **SOLID WASTE POLLUTION**



# WHAT IS SOLID WASTE ?

**SOLID WASTE** is any unwanted or unusable material arising from various human activities. It is either worthless or defective and of no use.

Consists of discarded materials from the Urban community as well as accumulation of agriculture, industrial and mining wastes.

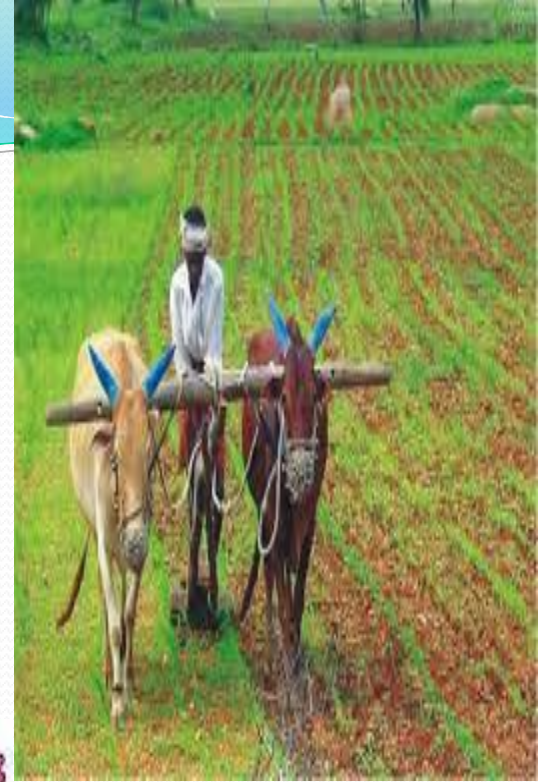
**SOLID WASTE GENERATION** is the by-product of the Urbanization, rapid industrialization, population growth and migration from the country side. It is commonly considered as an **Urban Issue**.

- **Solid Waste generation and management** is a burning issue all over the world and the planners and policy formulators are finding it extremely difficult to handle this problem mainly because of haphazard and unchecked urbanization.



# SOURCES

- **Agriculture**
- **Fisheries**
- **domestic**
- **Commerce and industry**



# CAUSES OF INCREASE IN SOLID WASTE

- Population growth
- Increase in industrial manufacturing
- Urbanization
- Modernization

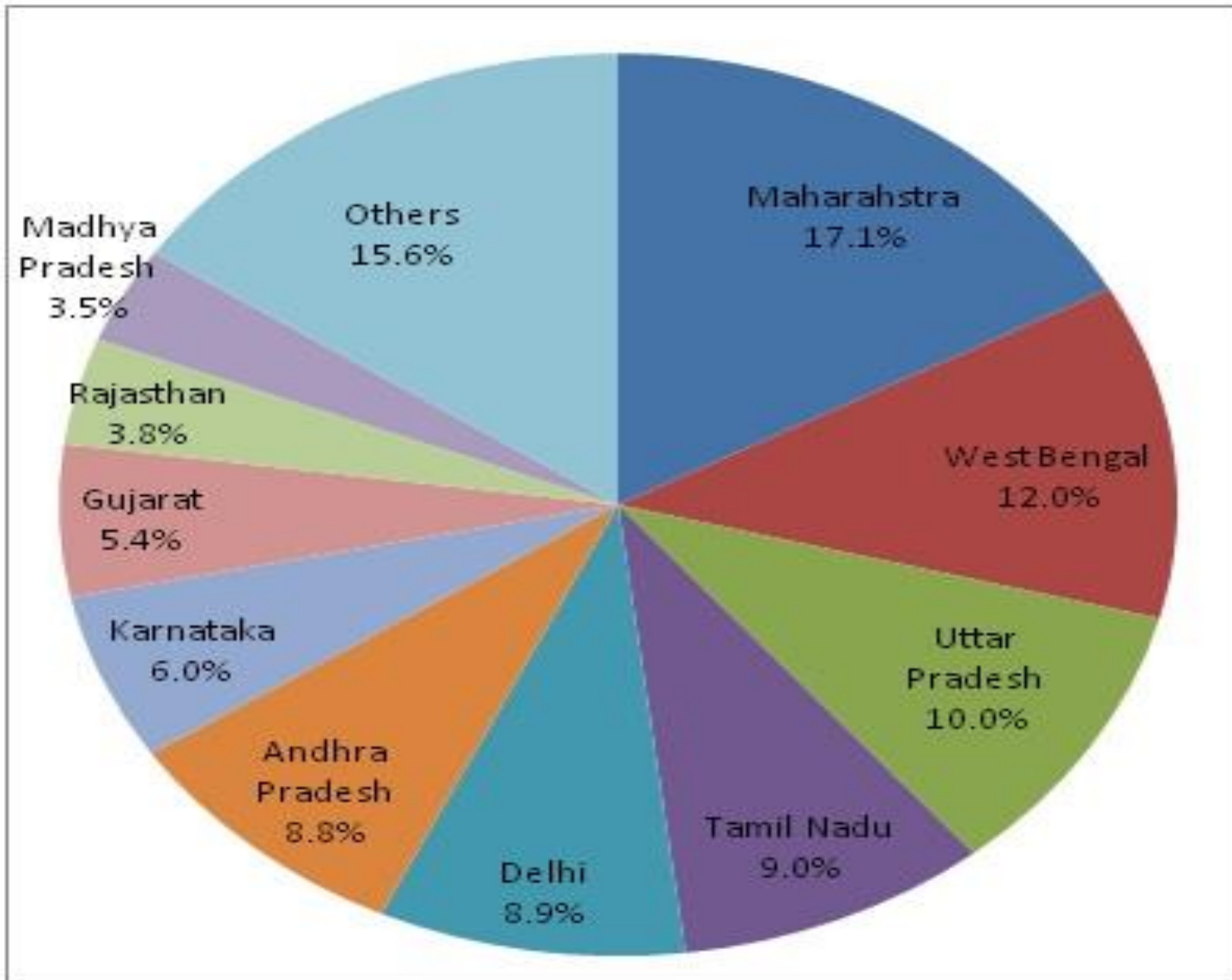
Modernization, technological advancement and increase in global population created rising in demand for food and other essentials. This has resulted to rise in the amount of waste being generated daily by each household



PER CAPITA SOLID  
WASTE PUTS UPTO  
0.25 – 2.5 Kg/day



# DELHI CONTRIBUTES ABOUT 9% OF TOTAL WASTE GENERATION IN INDIA





# Classification of Solid waste

- Garbage
- Rubbish
- Pathological waste
- Industrial waste
- Agricultural waste
- Ashes.

# Garbage:

Waste produced from preparation or storage of meat, fruit, vegetables etc. It is putrescible (decomposable) with 70% water content. May contain minerals and nutrients. Heating value 6000 KJ/kg

# Rubbish:

Non-putrescible solid waste. It can be either combustible (paper, wood, scrap, rubber etc) or non-combustible (metals, glass, ceramics etc). Water content 25%. Heating value 15000KJ/kg



# **Pathological waste:**

**Dead animals, humans etc. Moisture content is 85% and heating value 2500 KJ/kg. Also includes hospital waste (disposable syringes, swabs, bandages, body fluids etc). Highly infectious.**

# **Industrial waste:**

**Includes waste from coal or ore mines, electroplating works, textile industries, paper & pulp, chemical industries, oil refineries etc.**

# **Agricultural waste:**

**Includes animal manure, crop residues, herbicides, fungicides etc**

# **Ashes:**

**Residues of combustion of solid fuels**

# HOW IS SOLID WASTE POSING A PROBLEM ?

## ❖ Health hazard

- If solid waste are not collected and allowed to accumulate , they may **create unsanitary conditions**.
- This may lead to **epidemic outbreaks** .
- Many **diseases** like cholera. Diarrhea, dysentery, plague, jaundice, or gastro-intestinal diseases **may spread**



- Cause **loss of human lives**.
- In addition improper handling of the solid wastes causes **health hazard for the workers** who come in direct contact with the waste.

### ❖ Environmental impact

- If the solid wastes are not treated properly decomposition and putrefaction( decay) may take place .
- The organic solid waste during decomposition may **generate obnoxious (intolerable) odour**



# TREATMENT AND DISPOSAL METHODS

- Dumping
- Sanitary landfill
- Incineration
- Composting
- Recycling and reuse

# DUMPING

## DISPOSAL OF WASTE Open Dumps


Refer to uncovered areas that are used to dump solid waste of all kinds. The waste is untreated, uncovered and not segregated. It is the breeding ground of flies, rats and insects that spread the disease



# LANDFILLS



- Landfill – a structured place where trash is deposited



A **landfill site** (also known as **pit, dump, rubbish dump, garbage dump** or **dumping ground** ) is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. Historically, landfills have been the most common method of organized waste disposal and remain so in many places around the world.

All types of waste is dumped and when water seeps through them, contaminates the ground water and soil. Process is known as **leaching**.



# OKHLA LANDFILL SITE



## OKHLA

56-acre area: Okhla landfill's lifespan exhausted a long time back. However, the SDMC continues to dump garbage here



# GHAZIPUR LANDFILL SITE

You might mistake this for a hill, but it's not. This is the landfill the civic agency should have stopped using 3 years ago.

## GHAZIPUR

70-acre area: One of the oldest existing landfills. Though its lifespan is over, dumping continues

**9,000**

**TONNES**

Delhi's daily waste generation at present

**18,000**

**TONNES**

The waste Capital is likely to generate per day by 2021

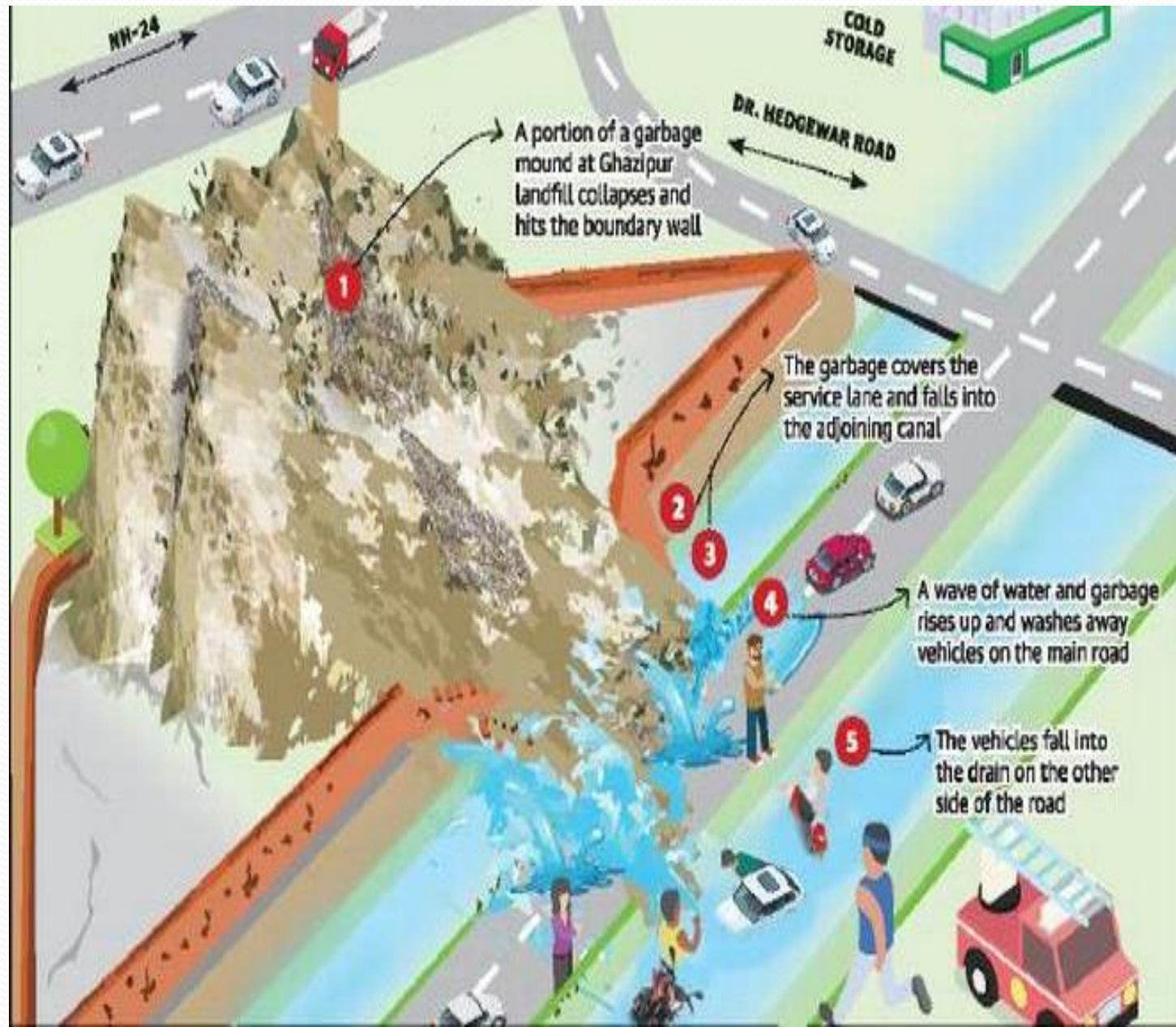
**650**

**acres**

Area of land required urgently to deal with Delhi's daily waste production



# GHAZIPUR LANDFILL COLLAPSED



# BHALSWA LANDFILL SITE



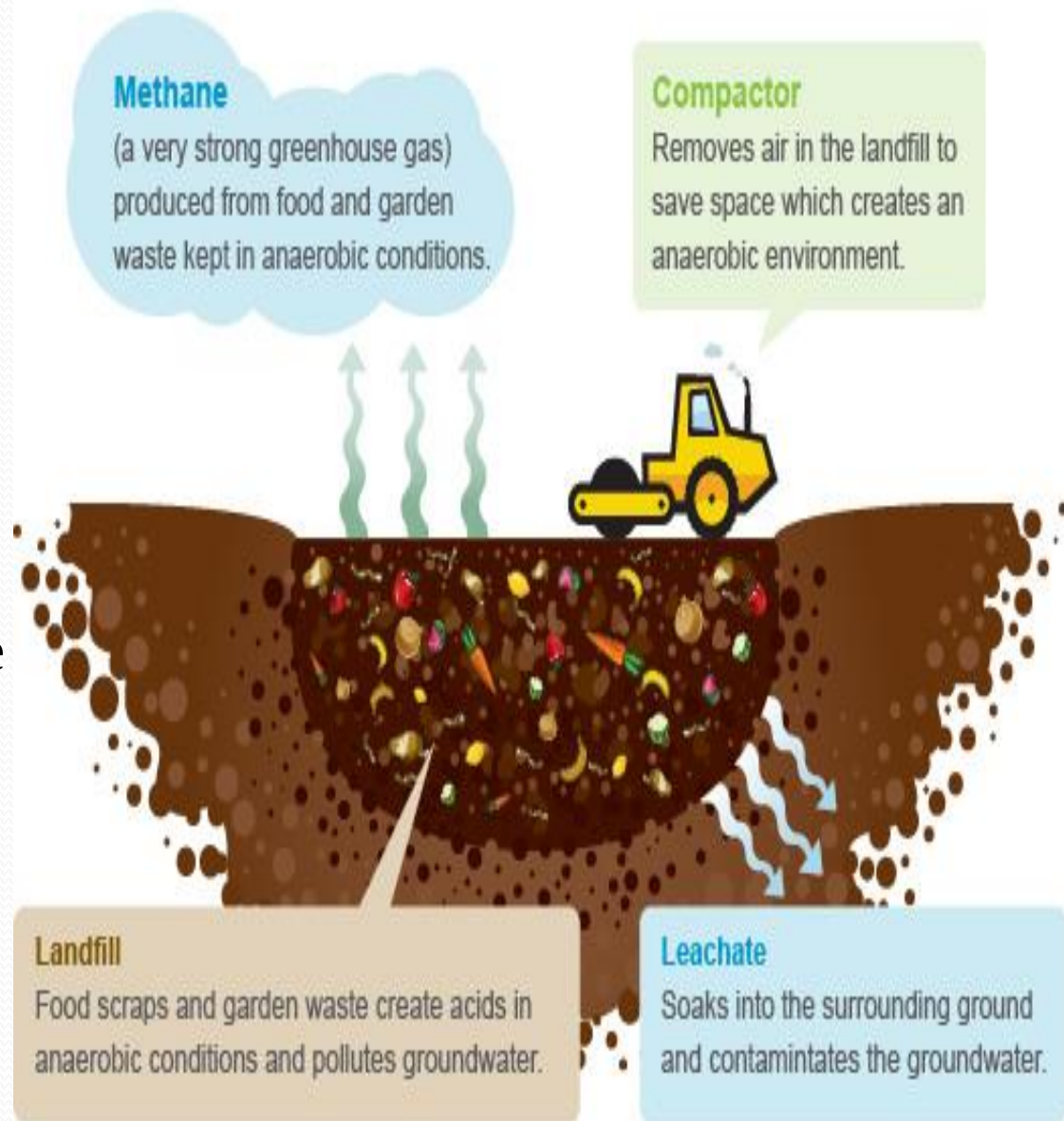
## **BHALSWA**

40-acre area: Commissioned in 1993. Managed by the north corporation, the landfill was primarily used for solid waste generated from south and west Delhi



# DISADVANTAGES

- The site looks ugly while it is being used for landfill.
- Dangerous gases are given off from landfill sites that cause local air pollution and contribute to global warming.
- Local streams could become polluted with toxins seeping through the ground from the landfill site.



# Millennium Indraprastha Park

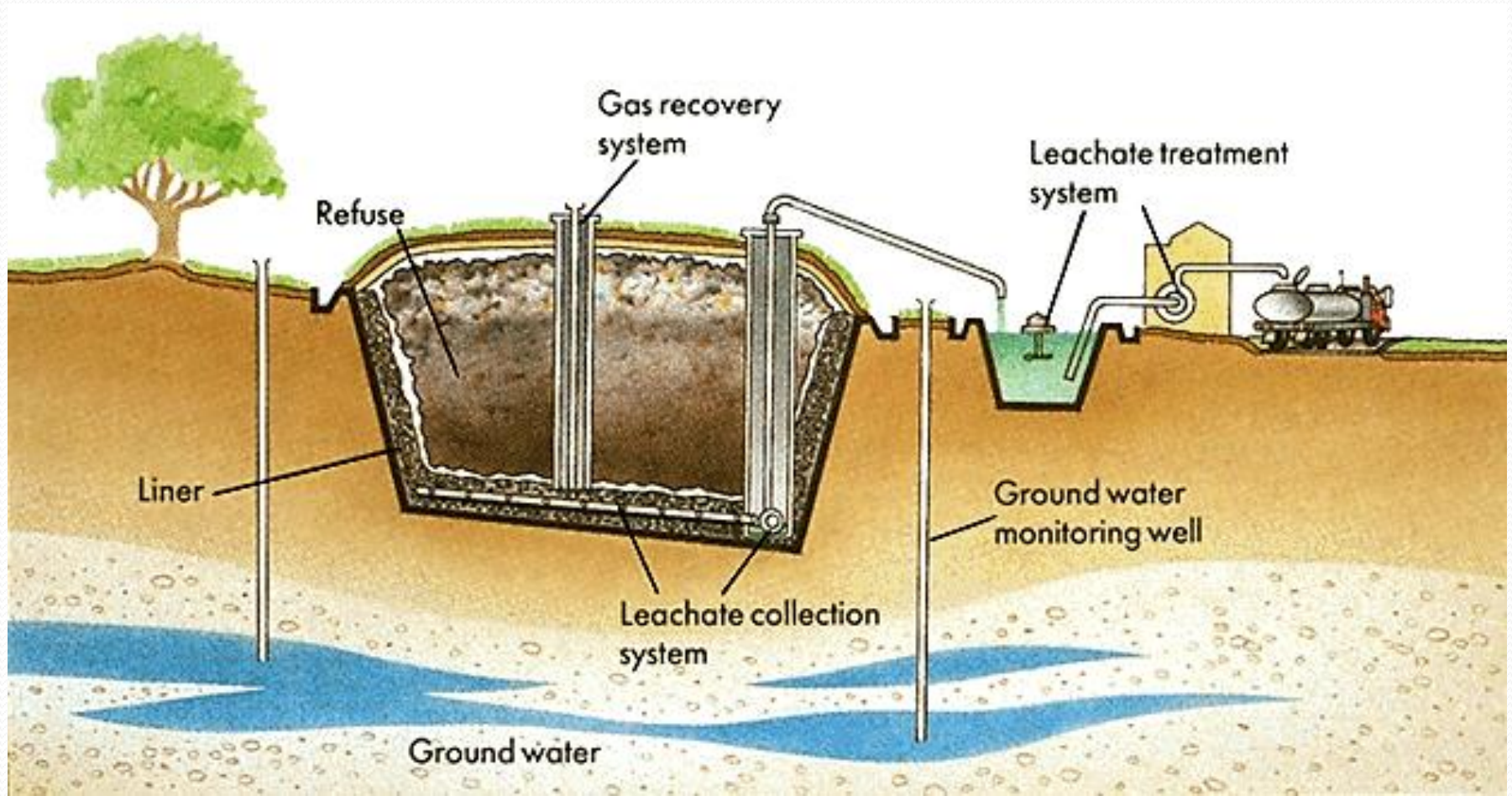


*Eco-park Built in 2004 on Okhla landfill with around 7,000 sqm of ground planted with grass.*



# SANITARY LANDFILL:

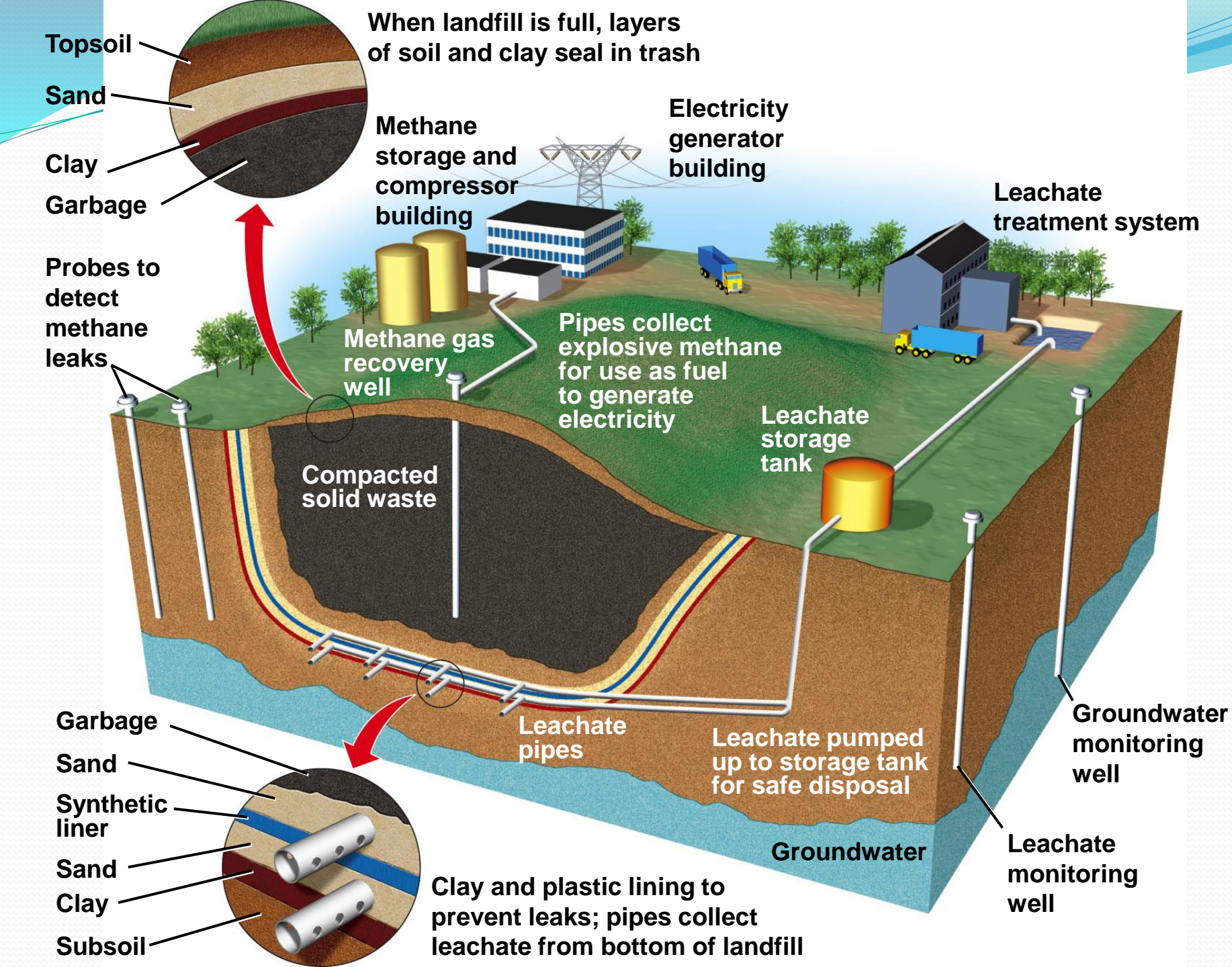
Sanitary landfills are sites where waste is isolated from the environment until it is safe.

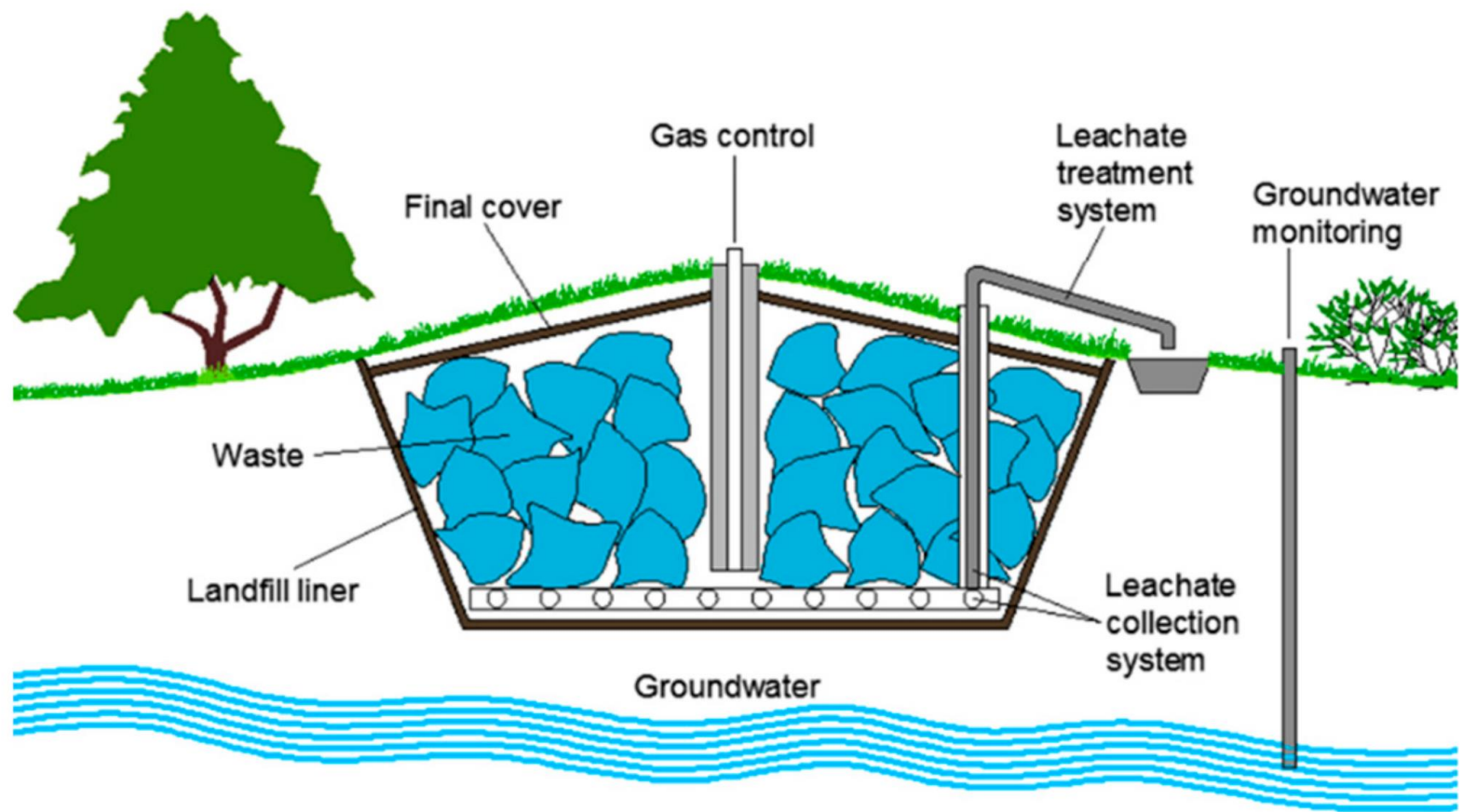


# SANITARY LANDFILLS









# How the sanitary landfill is built?

- Lined with materials that are impermeable such as plastics and compacted clay.
- Built over impermeable soil.
- Daily collections of waste are spread evenly across depression and are then covered with soil.
- Drainage systems are set around and beneath the liner to collect liquids leaching from garbage and waste.
- Collected liquids are treated to make them more environmentally safe.
- After the landfill is full, the area is covered with a thick layer of mud and the site can thereafter be developed as a parking lot or a park.



# Waste treatment in a sanitary landfill

- **Phase I**-Aerobic bacteria deplete the available oxygen due to aerobic decomposition.
- **Phase II**- Anaerobic conditions prevail and  $\text{H}_2\text{O}$  and  $\text{CO}_2$  are evolved.
- **Phase III & IV**- Methane forming bacteria decompose the organic matter to  $\text{CH}_4$  and  $\text{CO}_2$ . The escape vents for gases are provided in landfills.
- **Phase V**- Methanogenic activity decreases, representing the depletion of organic matter and ultimately the system returns to aerobic conditions within the landfill.

# Advantages of sanitary landfill

- Infectious diseases are minimized because flies, rats and other pests are unable to breed in covered pits
- No air pollution from burning
- Fire hazards are minimal



# NARELA-BAWANA LANDFILL SITE



**It is India's first scientific landfill on 150 acres area. The scientific landfill has the capacity to treat 2,000 tonnes of waste every day, generating 24 megawatts of electricity. With the Central Pollution Control Board's estimate of Delhi projected to generate 15,000 tonnes of garbage daily, this plant is expected to change the waste management scenario in capital.**

# INCINERATION

- **Incineration-method in which solid organic wastes are subjected to combustion so as to convert them into residue and gaseous products.**
- **This process reduces the volumes of solid waste to 70 to 80 % of the original volume. Used for disposing hazardous and infectious waste materials (biological medical waste).**
- **Incinerators convert waste material into heat, CO<sub>2</sub>, oxides of sulfur and nitrogen & other gaseous pollutants, flyash & residue.**
- **Useful material and energy can be recovered if process is done in properly equipped incinerators.**
- **Various pollution control technologies for treatment of emissions can be installed in incinerators:**
  - **Scrubbers –It uses a liquid spray to neutralize acid gases**
  - **Filters-remove tiny flyash particles from smoke.**

# COMPOSTING

Composting is the decomposition of organic matter by microorganism in warm, moist, aerobic and anaerobic environment.

Most simple and cost effective technology for treating the organic fraction of Municipal Solid Waste.

Main advantages of composting include improvement in soil texture and augmenting of micronutrient deficiencies. It also increases moisture-holding capacity of the soil and helps in maintaining soil health.



# VERMICOMPOSTING

- ❖ Vermi-compost is the natural organic manure produced from the excreta of earthworms fed on scientifically semi-decomposed organic waste.
- ❖ Normally, vermi-composting is preferred to microbial composting in small towns as it requires less mechanization and it is easy to operate. However, it is to be ensured that toxic material does not enter the chain which if present could kill the earthworms.



Photo by V. Jedlicka



# RECYCLING AND REUSE

The 3Rs (Reduce, Reuse, Recycle) to be followed for waste management.





# Reduce

The reduction of waste is one of the main step that can be taken to manage waste. It can be done in many ways like:

- Reduce office paper waste by implementing a formal policy to duplex all draft reports and by making training manuals and personnel information available electronically.
- Improve product design to use less materials.
- Redesign packaging to eliminate excess material while maintaining strength.
- Switch to reusable transport containers.
- Purchase products in bulk.

# REUSE

- Reuse office furniture and supplies, such as inter-office envelopes, file folders and paper.
- Use durable towels, tablecloths, napkins, dishes, cups and glasses.
- Encourage employees to reuse office materials rather than purchase new ones.
- Instead of buying new containers from the market, use the ones that are in the house.
- Don't throw away the soft drink can or bottle, cover them with home made paper or paint on them and use them as pencil stands or small vases.

# RECYCLE

## STOP:

- Before you throw your waste in the bin.

## THINK:

- Is there anything here you could have recycled?

## RECYCLE:

- Don't throw recyclable items in the bin-use recycling services.
- The private sweepers and garbage collectors employed by the people for cleaning privately owned premises, waste pickers, waste dealers and recycling industries, which consume recyclable waste to produce recycled products.



# Zero waste technology

**Zero Waste** is a philosophy that encourages the redesign of resources life cycles so that all products are reused.

Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.



Zero waste encompasses more than eliminating waste through recycling and reuse, it focuses on restructuring production and distribution systems to reduce waste.



**NOW WE CAN ACHIEVE  
ZERO WASTE**

**RECYCLING ALL OUR HOUSEHOLD WASTE  
IS NOW POSSIBLE**

As much as 50% of the waste is fit for composting. About 30 per cent of it can be recycled. Effective segregation at source, in transit and during disposal, will mean only 20 per cent of the refuse is needed to be sent to the landfill site. But instead of proper segregation, only random picking continues.



# WASTE MANAGEMENT HIERARCHY





# Conclusion

With ever increasing population and rapid urbanisation, the amount of waste generated is increasing alarmingly. With already exhausted landfills and high pollution levels, the solid waste disposal and management is a major challenge.

We, on individual level, are contributing a lot to the generation of waste . Thus, its our duty to contribute in the management of waste.

# Thanks

