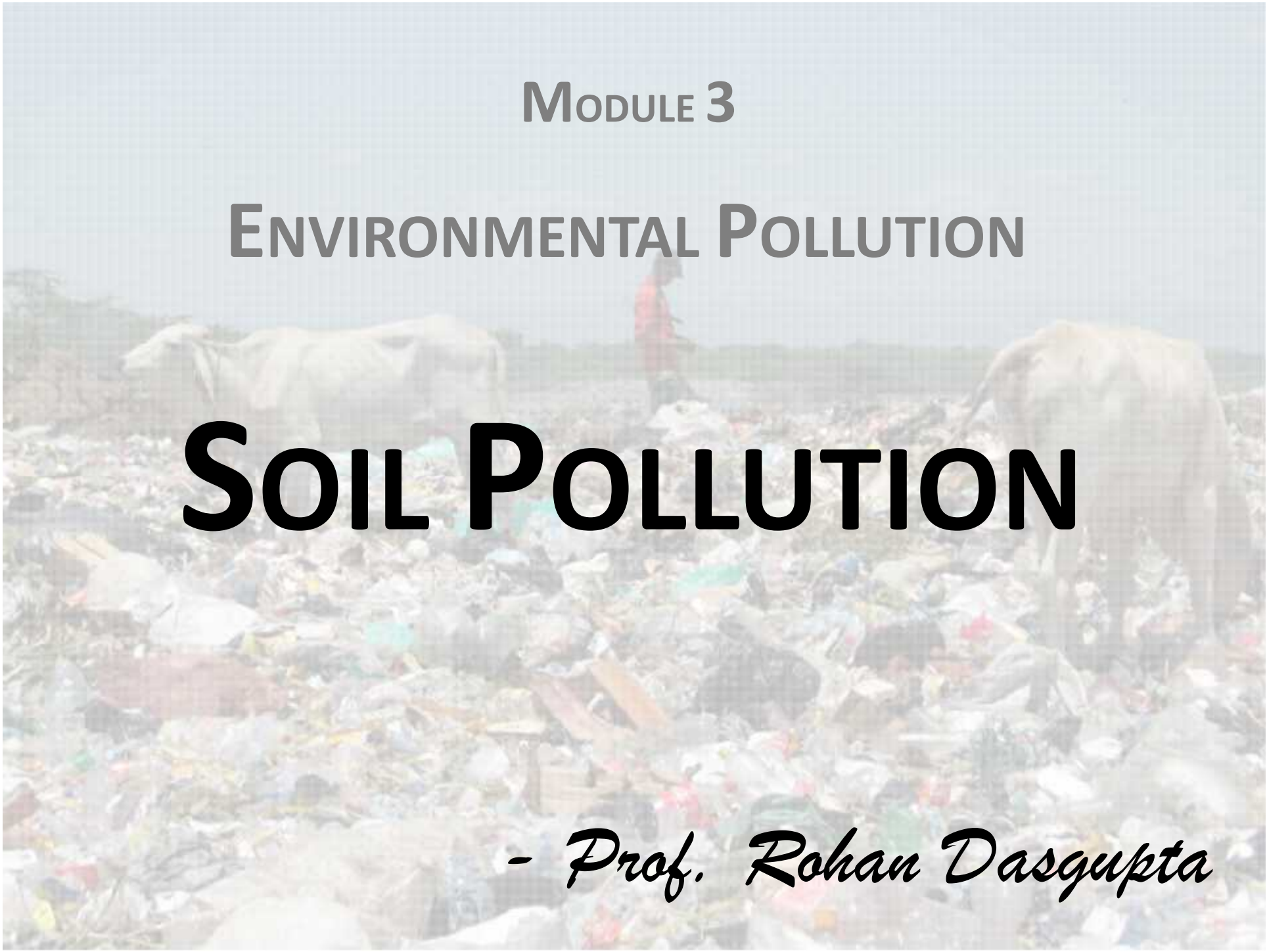

Module 3

Environmental Pollution

Soil Pollution

- Prof. Rohan Dasgupta

Soil Pollution or **Land Pollution** is the contamination of the land surface of the earth through i) unplanned dumping of municipal, industrial and biomedical waste in an in-discriminatory manner (i.e. without separation), ii) mineral exploration and iii) misusing the soil by harmful agricultural practices.

Solid Waste

• **Solid waste** comprises of all the wastes arriving from human and animal activities that are in solid state which are discarded as useless or unwanted.

• It includes the heterogeneous mass of throwaways from the urban communities as well as the more homogeneous accumulation of agricultural, industrial and mineral wastes.

• Types of Solid Waste:

i) Municipal Solid Waste
ii) Industrial Solid Waste
iii) Biomedical Solid Waste

SOLID WASTE – MUNICIPAL SOLID WASTE

- **Municipal solid waste** (MSW), commonly known as trash or garbage or rubbish is a type of solid waste consisting of everyday items that are discarded by the public from residential or commercial complexes.

- It consists of household wastes, construction and demolition debris, sanitation residue and waste from streets.

Solid Waste – Municipal Solid Waste

- In 1947, India generated 6 million tons of municipal solid waste.
- In 1997, India generated 48 million tons of municipal solid waste.
- More than 25% of the municipal solid waste in India is not collected at all.
- 70% of Indian cities lack the capacity to transport municipal solid waste and there are no *sanitary landfills* to dispose off the waste.
- The existing landfills are neither well-equipped nor well-managed and are not lined properly to protect against contamination of soil (and groundwater)

Solid Waste – Municipal Solid Waste

• Over the last few years, the consumer market has grown rapidly leading to products being canned in plastic, aluminum foils, plastic and many more such non-biodegradable items that cause harm to the environment.

• Some municipal areas have banned the use of plastic;
For eg. today one will not see a single piece of plastic in the entire district of Ladakh where the local authorities had imposed a ban on plastics in 1998.

Solid Waste – Industrial Solid Waste

- **Industrial solid waste** is defined as waste that is generated by businesses from an industrial or manufacturing.
- They're usually considered as hazardous as they are highly toxic to humans, animals and plants.
- They may also be corrosive, highly inflammable, explosive or violently reactive (under certain conditions).

SOLID WASTE – BIOMEDICAL SOLID WASTE

- **Biomedical solid waste** is generated during the diagnosis, treatment or immunization of human and animals or in research in these field or in the production or testing of biologicals.
- It may include wastes like sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes, syringes, swabs, bandages, bodily fluids, human excreta etc.
- It is highly infectious and can be hazardous to the human health if not managed in a scientific and discriminate manner.

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LANDFILLS

- A **landfill site** (also known as a **dumping ground**) is a site for the disposal of waste materials by burial
- Historically, landfills have been the most common method of organized waste disposal and remain so in many places around the world even today.
- Some landfills are also used for waste management purposes, such as the temporary storage, consolidation and transfer, or processing of waste material (sorting, treatment or recycling).

LANDFILLS: OPERATIONS

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1. The waste collection vehicles are weighed at a scale on arrival.
2. Their load is inspected for wastes that do not accord with the landfill's waste acceptance criteria.
3. The waste is then deposited on the tipping face or working front.
4. Bulldozers are used to spread the waste.
5. Compactors are used to compact the waste.
6. Before leaving the landfill site, the waste collection vehicles' wheels are cleaned.
7. The empty waste collection vehicles are weighed.
8. Through the weighing process, the daily incoming waste tonnage can be calculated and listed in databases for record keeping.
9. Typically, in the working face, the compacted waste is covered with soil or alternative materials at the end of the day's work.

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LANDFILLS: ADVANTAGES

- ✓ Landfills are often the most cost-efficient way to dispose of waste, especially in countries with large open spaces.
- ✓ Landfills have very less infrastructure setup cost and running cost.
- ✓ Landfill gas can be upgraded to natural gas which is a potential source of revenue.

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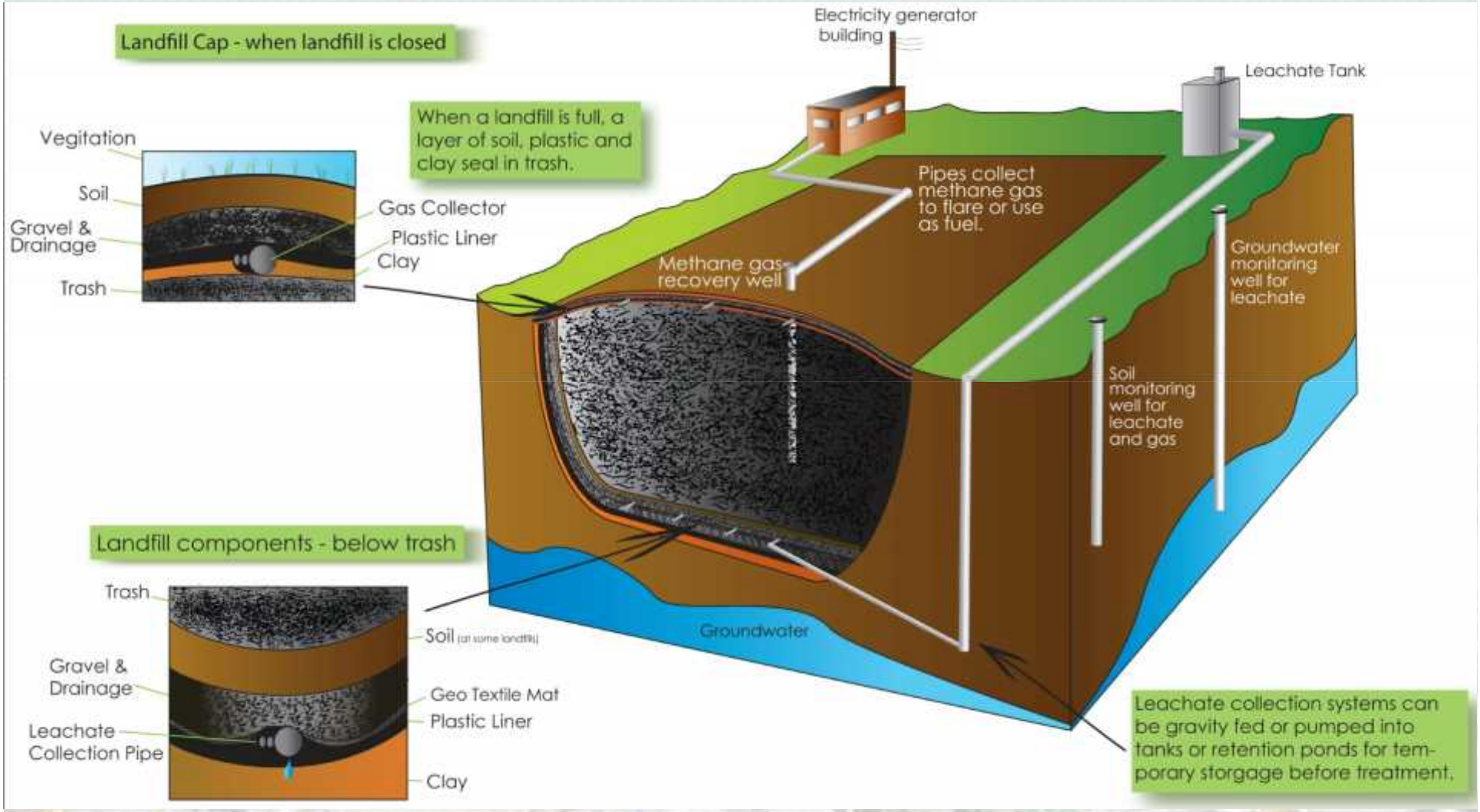
LANDFILLS: DISADVANTAGES

- Damage may occur to the access roads by heavy vehicles.
- Contamination of groundwater and aquifers may occur.
- Methane is naturally generated by decaying organic wastes in a landfill. It is a potent greenhouse gas, and can itself be a danger because it is flammable and potentially explosive.
- It attracts vectors such as rats and flies which can cause infectious diseases.
- It disrupts the natural wildlife of its location.
- It produces foul odour.
- It may be a source of noise pollution.
- The local property rates are reduced.

SANITARY LANDFILLS




1
2
3
4
BEFORE - CLOSED LANDFILL
AFTER - PV SOLAR FACILITY ON CLOSED LANDFILL

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COMPOSTING

- Composting is the decomposing and recycling of organic matter to produce fertilizer and soil amendment.
- It is a growing solution to solid waste management.
- At the simplest level, the process of composting simply requires making a heap of wetted organic matter known as green waste (leaves, food waste etc.) and waiting for the materials to break down into humus after a period of weeks or months.

COMPOSTING: MODERN OR METHODICAL COMPOSTING

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- Modern composting (or methodical composting) is a multi-step, closely monitored process with measured inputs of water, air and carbon & nitrogen-rich materials.
- The decomposition process is aided by shredding the plant matter, adding water and ensuring proper aeration by regularly turning the mixture.
- Worms and fungi further break up the material.
- Bacteria requiring oxygen to function (aerobic bacteria) and fungi manage the chemical process by converting the inputs into heat, carbon dioxide and ammonium.
- The ammonium (NH_4) is the form of nitrogen used by plants.
- When available ammonium is not used by plants it is further converted by bacteria into nitrates (NO_3) through the process of nitrification.

COMPOSTING: ADVANTAGES

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✓ Compost is rich in nutrients.
✓ It is used in gardens, landscaping, horticulture and agriculture.
✓ The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids and as a natural pesticide for soil.
✓ In ecosystems, compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover.
✓ Organic ingredients intended for composting can alternatively be used to generate biogas through anaerobic digestion.

Waste Sorting

✓ **Waste sorting** is the process by which waste is separated into different elements.

✓ It means dividing waste into dry and wet.

✓ **Dry waste** includes wood and related products, metals and glass.

✓ **Wet waste** typically refers to organic waste usually generated by eating establishments and are heavy in weight due to dampness.

✓ Waste can also be segregated on basis of **biodegradable** or **non-biodegradable waste**.

WASTE SEPARATION GUIDE

COMPOSTABLE

Compostable or paper bags

All fruits, vegetables & peelings
All meat, fish, & bones
Bread products
Coffee grounds & filters
Dairy products
Eggs & shells
Lobster, clams & shellfish
Pasta, grains, & rice
Pet waste
Tea leaves & bags

Soiled Paper Products

Damp & soiled papers
Food napkins & paper towel
Kleenex
Paper plates
Paper sugar, flour & potato bags
Paper fast food wrappers
Pizza boxes

Yard Waste

Leaves
Sawdust & wood shavings
Small branches & plants
Weeds

NO PLASTIC OR METAL

RECYCLABLE

Clear non-coloured or transparent blue bags

Aluminum cans
Aluminum pie plates & foil
Books– soft & hard covers
Boxboard– cereal boxes
Clear plastic wrap
Corrugated cardboard
Detergent boxes
Empty paint and aerosol cans
Envelopes
Glass beverage containers
Glass food containers
Greeting cards
Juice boxes
Magazines & phonebooks
Milk cartons
Newspaper & flyers
Office paper (including shredded paper)
Paper egg cartons
Plastic bags
Plastic beverage & food containers
Plastic containers ♻ 1,2,3,4,5,6,&7
Steel and tin cans

****Please note****

All items must be clean.

Remove caps from bottles - place in garbage.

Absolutely no food waste.

Styrofoam is garbage.

GARBAGE

Clear non-coloured bags

Bandages
Broken glass, ceramics & dishes
Calculators & pens
Candy bar wrappers
CDs, cassettes & video tapes
Cigarette butts & ashes
Clothes & footwear
Cookie bags
Diapers
Disposable coffee cups
Disposable razors
Dog & cat food bags
Empty motor oil containers
Laminated items
Light bulbs
Liners from cereal boxes
Meat trays
Netted onion bags
Photographs
Potato chip bags
Plastic utensils
Sanitary products
Straws
Styrofoam
Toothpaste tubes
Toys
Vacuum cleaner bags
Wrapping paper


Thank you!