

Chapter 30 Waste Management

Case Study: Fresh Kills Landfill, New York City

Discusses one of the largest landfills in the world. It used to receive 21,000 tons of trash a day, but after recycling it receives 12–14,000. The city now “exports” trash to other areas, because there is not enough space in New York City to store all the trash generated in New York City. The landfill will be converted to a park. Challenges include controlling **leachate** which is the liquid formed when water percolates through a landfill and absorbs pollutants from the garbage (or **refuse**). Fresh Kill will generate over 1 million gallons per day.

Modern trends in waste management

The dominant trend today is Integrated Waste Management (IWM) this includes reuse, reduction, recycling, composting, landfill, and incineration.

Reduce Reuse Recycle (the “Three Rs”)

Reduce means to not produce or purchase as much waste *ie don't get a bag at the store if you don't need it, purchase products with less packaging.*

Reuse means just what it sounds like. Instead of throwing something away find another use for it (this can also lead to reduction)

Recycle means to actually melt or crush used material and reprocess them into new materials. This can be done with paper, other wood products, plastic, and glass.

It is suggested that using the three Rs could decrease the waste going to landfills by as much as 50% with recycling accounting for 30% of that reduction. Laws now require many cities to reduce their waste by recycling (or face heavy fines) and the public appears to be supportive in separating trash for collection by their cities.

What is in our trash

Mostly paper (fig. 27.2) then other materials. The largest single waste item is newspaper.

WAYS OF DEALING WITH WASTE

On Site Disposal – garbage disposals in our sinks. The waste then goes through the sewage treatment process

Composting is the collection of biodegradable waste such as food and yard clippings in order to allow them to decompose into soil which can be used for fertilizer. In order to assist this the waste is exposed to enzymes and worms. This can be done on many scales, including household backyard composting which can be used in gardens.

Incineration is the burning of waste at high temperatures in order to reduce to ash and non-combustibles. This reduces waste by about 50% (same as could be achieved with the 3 Rs). One advantage of it is that the heat could be used to generate electricity. But incineration produces air pollution including pollutants related to acid rain and pollutants containing heavy metals. In the US about 10% of waste is disposed of by incineration.

Sanitary landfill (fig 27.5) is the name given to a place where waste is collected, managed, and covered in order to reduce environmental impacts including access to the waste by insects and wildlife.

Leachate (see case study) is the most significant hazard, especially to groundwater. Leachate is managed by lining the bottom of the landfill with plastic and clay and installing pipes to collect the leachate and take it to a treatment center.

Methane is also produced by the decomposition of the waste in the landfill. In order to manage the possible hazard of the methane burning, collection pipes are installed in a sanitary landfill to collect the methane and carry it to a power plant where it can be burned to generate electricity, or excess methane can be burned off safely.

Site selection – sanitary landfills are best placed in areas with a low water table, little rainfall, relatively impermeable soil, and not too close to homes.

Monitoring is an important aspect of a landfill. Wells are placed into the water table surrounding the landfill so that if any leachate leaks into the groundwater it can be detected early and appropriate actions can be taken.

Hazardous waste management

About 35,000 chemicals used in the US are considered potentially hazardous. Hazardous waste if not taken care of properly can be a major environmental problem as at **Love Canal (Closer Look 27.1)** where waste was dumped from 1920 to 1950 and then houses were built over the site. In 1976–77 heavy rains and snows brought much of this hazardous waste to the surface. 200 homes and a school had to be destroyed to clean the site.

Hazardous waste is now disposed of in special sites that are designed similarly to sanitary landfills (fig 27.6).