

Solid Waste Prevention and Management

EQUIPMENT NEEDED

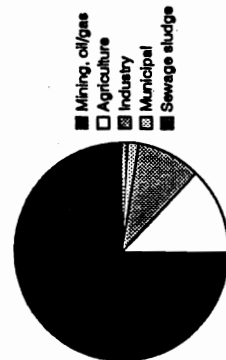
None

People dispose of personal solid waste, material for which they have no use, by littering and by utilizing their municipal waste management system. They drop cigarette butts, candy wrappers, and film packaging wherever they happen to be because they are either too lazy or too uncaring to dispose of them in a more appropriate way. Each of us can easily avoid contributing to that particular type of solid waste problem.

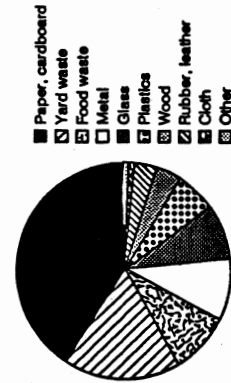
We can also affect the disposal of solid waste generated in the extraction of resources, in industry, and in agriculture (see Fig. 20-1) by supporting regulating legislation. Because the waste is generated by those in business, some of it will be voluntarily recycled because it is obvious that it makes good business sense to do so. We can have the greatest effect on solid waste generated in these sectors by reducing the amount of Earth's resources we use and by getting more use out of those resources we use through reuse and recycling.

Although municipal waste—the waste we contribute to directly through our homes, stores, and offices—amounts to only about 1.5% of the solid waste produced in the United States in a year, it still is a significant amount. It is estimated that the United States produced 185 million tons (370,000,000 pounds) of municipal waste in 1990. We can directly help to make these numbers smaller by reducing our use and by reusing and recycling. We also need to look at ways to use waste that is not reusable or recyclable.

Much of the "waste" that people in cities and towns throw away is potentially of some value. Figure 20-2 shows the makeup of municipal waste. The value of some of these materials may not be obvious, but almost all of it can be used in



Source: Data from EPA and U.S. Bureau of Mines



Source: Data from EPA and Franklin Associates

Figure 20-1. Solid waste in the United States.

Figure 20-2. U.S. urban waste, 1989.

some way. Much of our waste material is packaging material: paper and cardboard, metal, glass, and plastics. Is all of this packaging necessary?

Think of what you throw away. What were the items in your trash originally used for? Look in your trash can and evaluate your trash. Then think about how you can generate less waste, and whether your lifestyle would be appreciably lessened if you were to do so. Also, you can think about whether any of your trash could be reused or recycled. The following table provides space to note the kind of waste you generate. Fill it in, being sure to include things that you might ordinarily overlook. For example, in order to purchase four wood screws, we have to buy ten or twelve wood screws, a plastic bubble, and a piece of cardboard. (EYELESS packaging)

EXERCISES

- Complete the following chart to report on the solid waste you and your family generate.

Waste Category	Items Included	Possible Uses
Paper, cardboard		
Yard waste		
Food waste		
Metal		
Glass		
Plastics		
Wood		
Rubber, leather		
Cloth		
Other		

- Using the estimate above of 185,000,000 tons, complete the following table to indicate how much of each category of "waste" material is included and how it might be used.

Waste Category	Percent	No. of Tons	Possible Uses
Paper, cardboard	41%		
Yard waste	18%		
Food waste	9%		
Metal	9%		
Glass	8%		
Plastics	7%		

Seeing the actual amounts, rather than percentages, gives us a better idea how much waste there is.

There are several ways of disposing of solid waste. Before 1976, a large part of the municipal solid waste generated in the United States was put in dumps, which were simply hillsides, ravines, or other low or sloping places where people would throw their rubbish. Sanitary landfills replaced dumps, for the most part, sometimes on the same site as the former dump. These have eliminated most of the problems that dumps posed, but they continue to endanger the ground water. Furthermore, they make potentially useful materials unavailable by storing them in the ground. Incineration has become more popular, and recycling is becoming increasingly popular. Each method of solid waste disposal—landfilling, incineration, and recycling—may have certain advantages and disadvantages that depend on the local situation.

A group of Detroit suburbs, consisting mostly of white-collar and professional residents, had a population of 50,200 in 1991. The operator of the incinerator to which their waste was sent estimated that the total solid waste generated in 1991 weighed 32,798 tons.

3. What was the number of tons per person?
4. What was the number of pounds per person?
5. What was the number of pounds per person per day?

6. How does your answer to question 5 compare with the U.S. national average of 3.6 pounds/person/day?
7. How do the "affluent suburbs" compare with the national average in the following table?

In 1991, the GDRRA processed some solid waste from other communities, in addition to the Detroit waste, for a total of 733,544 tons. Let's look at what happens to the waste and prepare a breakdown of waste processing.

When the waste arrives at the GDRRA, it passes through several separation processes listed below, not necessarily in the order that they occur in the processing sequence, with the amount of material separated in 1991.

Process	Tons
Separation of bulky waste, such as appliances, mattresses, carpeting	17,228
Recovery of ferrous (iron-containing) metals	38,745
Separation of process residue that passes through a 1-inch screen (Includes "dirt," grass, glass bits, etc.)	142,234

After these materials are separated, the remaining material is incinerated.

12. How much of the total is incinerated?
_____ tons
13. Calculate the percentage of the total for each category:

bulky waste	_____%
ferrous metals	_____%
process residue	_____%
incinerated	_____%

Incineration of the combustible material leaves 127,260 tons of ash.

14. What percentage of the total waste remains as ash?
_____%

15. What happens to the rest of the matter in the waste?

Process residue is landfilled. Ash is placed in a monofill landfill (a landfill designed for just one kind of waste).

According to the Detroit Department of Public Works:

The cost of landfilling is currently \$40-50 per ton delivered to the fill site. Cost of delivery varies according to items and distance, and consideration is given to whether it is light material such as cotton waste or heavy materials such as stone. The cost of disposal after delivery to the GDRRA facility approximate \$70 per ton. This can vary with the amount and type of material delivered.

The GDRRA facility has reduced Detroit's dependence on landfills by 80% and extended the existing landfill life by 5-9 years.

It uses the heat from incineration to produce electricity and steam for heating large downtown buildings. In 1991 this amounted to:

Steam:	Equivalent households	4,500 (33,550,000 kwh)
Electricity:	Equivalent households	8,000

Waste Type	National Average	Affluent Suburbs
Paper	41%	22%
Yard waste	18%	31%
Food waste	9%	12%
Metal	9%	5%
Glass	8%	3%
Plastics	7%	3%
Wood	3%	8%

8. By 1991, drop-off recycling of newspapers had been quite well established. Newsprint, it is estimated, makes up about 50% of the waste paper in this community. Would recycling explain why the amount of waste paper was different than the national average?

9. What might be a reason that yard waste is above average in this type of community?

10. Calculate the percent of each type of waste recycled in the "affluent suburbs" according to the data, using the following table. (pounds recycled/pounds produced x 100)

Type of Waste	Pounds Produced	Pounds Recycled	Percent Recycled
Newsprint	3,444	3,229	_____
Steel cans	755	345	_____
Glass containers	916	850	_____
Plastic	269	200	_____
	(According to incinerator)	(According to recycling co.)	

In 1991, the Greater Detroit Resource Recovery Authority, (the "Detroit Incinerator") processed 526,982 tons of the approximately 700,000 tons collected in the city of Detroit.

11. What percentage of the solid waste produced by Detroit is processed by the GDRRA? (tons processed/tons collected x 100)