

Lesson 13: The Problem of Waste (Grades 7–8)

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Objective

Students will become aware of the causes of waste, the harmful consequences of waste, and the estimated amount of time required for the substances found in waste to decompose. They will realize that it is necessary to save resources, reuse waste, and benefit from it. Garbage will be viewed as a source for profit. Each person's role in efforts to reduce waste will be emphasized. Students will learn about waste management in other countries, as well as in Armenia.

Lesson 13.1: Causes and Harmful Consequences of Waste: Trash Bag Archaeology

Duration: 45 minutes

What do you need?

A cloth bag with some garbage inside: an old shoe, a banana peel, a cotton rag, a used food can, a plastic container, a cigarette.

What do you do?

Explain to your class that an archaeologist is a scientist who studies ancient cultures by studying what they leave behind, sifting through the earth to find remnants of homes and important buildings. Armenian archaeologists currently study ruins of ancient Urartu society using these same methods to learn about ancient land use and other aspects of Urartu culture. For more in-depth information on Armenian archaeological sites and research in your area, information is available online at <http://www.virtualarmenia.am>.

In the classroom, empty your trash bag onto several pieces of newspaper or a piece of cloth. Ask the class: What does each item tell us about the users? How old are they? Did they play sports? What is important to them? What would someone from the future think of these items? Finally, ask the students: How long will it take for these items to degrade in the earth? Which one will degrade the fastest?

Draw attention to the items you have gathered by listing the items on the chalkboard. You might ask, "What do all the items have in common?" If your students are too young to figure out the answer to the question, you can explain that each of the items will likely end up in a landfill. Next, ask: "What will happen to these items when they are thrown away? How long do you think they will last there? Do they disappear, disintegrate, or degrade immediately? Or will they continue to take up space in the landfill?" Let students freely discuss those questions.

Ask students to work in pairs and come up with a list of items they might find in a garbage can. Then, next to each item they write their own estimates of how long it might last when buried in a landfill. Then they make another list with the items that can be reused.

When everyone has finished, it is time to compare the students' answers with the estimates made by scientists:

Banana	3 to 4 weeks
Paper bag	1 month
Cotton rag	5 months
Wool sock	1 year
Cigarette butt.	2 to 5 years
Leather boot	40 to 50 years
Tin can (soup)	80 to 100 years
Aluminum can (soda)	200 to 500 years
Plastic jug	unknown
Glass bottle	unknown, forever?

Students compare these data with their own estimates, and discuss the reasons why each item requires a different amount of time to decompose.

Anticipated conclusion

Waste contains substances that are fast degradable, slow degradable, and substances that do not decompose at all. Not all substances are decomposed by saprophyte bacteria, nor are they brought in the material cycle. As a result, huge heaps of garbage are generated.

Homework assignment

1. Ask students to complete the environmental behavior assessment chart (see below) with their parents.
2. Have students draw an action plan for reducing municipal waste and implement it.
3. Have students survey their family members on the impact that saving and reusing resources may have on the economic conditions of a family. Students bring the findings to class for further discussion.

* The data above was gathered from sources such as the United States Bureau of Land Management and the Oregon Department of Environmental Quality. Adapted from http://www.education-world.com/a_lesson/03 /lp308-04.shtml by Gary Hopkins.

Lesson 13.2: Ways of Reducing Waste: Waste as a Source of Profit

Duration: 45 minutes

The lesson begins with a discussion of the homework assignment in Lesson 13.1. The teacher then splits the class into groups of three or four and suggests completing the table below.

The groups present their tables to the class.

Reading: The Problem of Waste

The dumping of household garbage and industrial waste in the environment results in ecological imbalances locally and across the entire planet. Armenia is a beautiful country, but it is impossible to enjoy its beauty because its landfills are growing in size daily. People here dump one million tons of waste each year (approximately 350 kilograms of garbage per person) in ravines or landfills where no waste treatment is done or they just litter nearby areas.

Waste contains many hazardous materials which can cause diseases such as asthma and cancer when degraded or burned. There are many items which you mustn't simply dump wherever you want. Moreover, waste products should be kept away from children and animals. Waste treatment is a crucial issue. It is first of all about collecting and treating household garbage.

In some developed countries, they use drop-off boxes designed for each type of waste. For example, brown boxes are for paper waste, yellow boxes are for metal or plastic items, and green boxes are for food waste. The latter is used for composting or producing biogas.

Over the last 100 years the Japanese have been viewing waste as a resource. In Japan, 34 percent of solid waste is used as fuel. As a result of burning waste in special furnaces, heat is produced which is then used to generate electric power.

Anaerobic bacteria help decompose waste and emit biogas. Household garbage treatment, for the purposes of generating biogas, is used in many countries today. This allows people to address multiple ecological issues. Biogas is now used as a fuel and as a source of energy, heat, and steam.

Any country in the world, including Armenia, needs to view waste as a source for profit, and should invest in technologies necessary for waste treatment. Fortunately, the Armenian government has started to take actions to this end.

Let's minimize the use of plastic bags

The simplest way to reduce waste in the environment is by refusing to use plastic bags that are not degradable and that cause environmental contamination. When burned, they generate toxic substances that can cause serious diseases. Movements to ban the use of plastic bags are spreading worldwide. It is time for us to return to cloth bags, too.

Why don't we discard unwanted items?

In 2003, a group of Americans who wanted to give away their unwanted objects created an internet site: www.freecycle.org. Announcements about items to be given away for free or swapped were placed on this site. The managers of this site claim that every day 500 tons of items were saved from becoming garbage. We don't have a similar site in Armenia, but it is the right time to create one.

Homework assignment

1. Search various sources for information on other countries' experiences recycling garbage
2. Prepare reports on what you have done
3. Write a short essay titled "A 23rd Century Archaeologist in a Yerevan Landfill"
4. The teacher encourages students to write a message addressed to each resident and display copies in prominent public places. The message can look like this: "Dear friend, you may think that essential environmental decisions are made only by governments. But there are many things we should be responsible for: reducing the amount of garbage in our homes; minimizing the use of plastic bags and plastic bottles by replacing them with cloth bags and glass bottles, collecting paper waste and old clothes in special bins for reuse instead of throwing them away. Each of us can do something for a healthy environment. Only this way, beginning with ourselves, will it be possible to save nature and ourselves."

* Adapted from Creating Activities Program, Discovering Me and the Rest of the Universe. Children's Press. 1974.

Supporting Materials

The Problem of Waste		
Causes of generation and accumulation of waste	Consequences	Solutions to the problem

Environmental Behavior Assessment Chart

Things to do in the future	I can not do this	I do not want to do this	I will do this	It is easy—I will definitely do this
Collect and recycle paper				
Use cloth bags for grocery shopping				
Collect and recycle glass, plastic, and metal containers				
Minimize the use of plastic bags				
Compost garbage in the backyard				
Give away old clothes and items (don't discard them)				