

School Recycling Club SHIP

(Supporting Home Instruction Program)



Lesson Plan 3

- Grade Level: 9-12
- Lesson: I.B.1—How Does Waste Affect Our Natural Resources?
Nonrenewable Resources
- Source: *3Rs of the Common Core*
- Activity/Craft: Soda Cap Containers
- Data Link: The Latest Container Recycling Rates (https://resource-recycling.com/recycling/2020/02/14/data-corner-the-latest-container-and-packaging-recycling-rates/?utm_medium=email&utm_source=internal&utm_campaign=March+17+RR)
- Video Link: Nonrenewable and Renewable Resources (<https://www.youtube.com/watch?v=PLBK1ux5b7U>)



Lesson Matrix Grades 9-12

3R's of the Common Core

Lesson	Leading Question	Objective	Common Core Alignments	Skills
9-12 Sources of Waste I.A.1	How do we determine the amount of waste we produce?	Research the sources of waste in society Trace the production of waste in industry	Grade 9-10 CC.RI.9-10.7 CC.W.9-10.7 CC.HSS.ID.1	Analyzing Collecting and interpreting data Designing Researching
9-12 Packaging Preferences I.A.2	How have beverage containers changed over the years?	Evaluate the environmental impact of different packaging types	Grade 9-10 CC.W.9-10.4 CC.WHST.9-10.7 CC.HSS.ID.1	Evaluating Gathering information Graphing data Researching
9-12 Nonrenewable Resources I.B.1	How long will our natural resources last?	Compare estimated life expectancies of some nonrenewable natural resources Understand the role recycling and careful use play in meeting the demand for extending availability of these resources	Grade 9-10 CC.L.9-10.6 CC.RST.9-10.7 CC.SL.9-10.2 CC.W.9-10.4	Applying ideas to solve problems Explaining Interpreting data Predicting outcomes
9-12 Shopper Survey I.C.1	What things influence our purchasing choices? Why is there so much waste?	Assess typical purchasing criteria Determine the influence of packaging on consumer choices Determine if consumers consider waste disposal and recycling when making purchases	Grade 9-10 CC.SL.9-10.3 CC.W.9-10.4 CC.HSS.IC.3	Analyzing Gathering information Hypothesizing Interviewing
9-12 Garbage I.C.2	Name something that New York City produces more of than any other city in the world.	Read Katie Kelly's essay "Garbage" to examine author's use of analysis and persuasion Examine continuing problems of trash volume and disposal	Grade 9-10 CC.RI.9-10.3 CC.SL.9-10.3 CC.W.9-10.4 CC.HSS.ID.1	Analyzing Evaluating Interpreting information Researching
9-12 The Dump Ground I.C.3	What do people mean when they use the expression, "One man's trash, another man's treasure"?	Interpret the themes of "The Dump Ground" and "Garbage" Derive history and culture of a people from the essays	Grade 11-12 CC.RI.11-12.6 CC.RI.11-12.10 CC.SL.11-12.1c CC.W.11-12.4 CC.HSS.ID.1	Analyzing Comparing Evaluating Interpreting
9-12 GNP(P):Great New Purchasing Power I.C.4	Does a higher income cost more?	Detect general relationships between GNP/capita and energy consumption per capita Examine the specific factors encouraging high energy use Understand relationship between recycling and conserving energy	Grade 9-10 CC.L.9-10.6 CC.W.9-10.4 CC.HSS.ID.6	Evaluating Graphing data Interpreting data Recognizing patterns

Lesson	Leading Question	Objective	Common Core Alignments	Skills
9-12 New Landfills II.A.1	If we need a new landfill, how will we go about siting and designing one?	Become familiar with local government, land-use planning, and complexities of solid waste planning process	Grade 9-10 CC.RI.9-10.7 CC.SL.9-10.2 CC.WHST.9-10.8 CC.HSG-MG.3 Grade 11-12 CC.RI.11-12.7 CC.SL.11-12.2 CC.WHST.11-12.8 CC.HSG-MG.3	Comparing solutions Designing Gathering information and data Problem solving
9-12 Methane II.A.2	Can we recover energy from solid waste?	Understand the energy-producing potential of some solid wastes Understand some systems of generating methane from waste	Grade 9-10 CC.RST.9-10.3 CC.SL.9-10.1 CC.WHST.9-10.7 Grade 11-12 CC.RST.11-12.3 CC.SL.11-12.1 CC.WHST.11-12.8	Carrying out investigation Interpreting data Observing Researching
9-12 Spreading Sludge II.A.3	Is it safe to put sludge on land all year round?	Determine the benefits and drawbacks of land application of sewage sludge	Grade 9-10 CC.SL.9-10.1c CC.SL.9-10.4 CC.W.9-10.6 CC.W.9-10.7 Grade 11-12 CC.SL.11-12.1c CC.SL.11-12.4 CC.W.11-12.6 CC.W.11-12.7	Evaluating Formulating questions Gathering information Hypothesizing Interviewing
9-12 Toxic Waste in the Lab II.A.4	Are there alternatives to disposal of toxic wastes in the solid waste stream?	Upgrade the school's lab cabinet	Grade 9-10 CC.RST.9-10.3 CC.SL.9-10.4 CC.W.9-10.7 Grade 11-12 CC.RST.11-12.3 CC.SL.11-12.4 CC.W.11-12.7	Carrying out investigation Evaluating Explaining Researching
9-12 Community Solid Waste II.B.1	How do we manage our solid waste?	Evaluate both the current solid waste disposal practices and future plans in their community	Grade 9-10 CC.SL.9-10.2 CC.SL.9-10.4 CC.W.9-10.4 Grade 11-12 CC.SL.11-12.2 CC.SL.11-12.4 CC.W.11-12.4	Communicating information Designing Gathering information and data Synthesizing
9-12 Twenty Foot Swath III.A.1	Have personal or global problems such as poverty or environmental pollution ever become so overwhelming that you were immobilized or driven to some action that actually aggravated the problem?	Discern the author's purpose in writing the essay Develop a plan for decreasing pollution in environment by setting realistic personal goals	Grade 9-10 CC.RI.9-10.3 CC.SL.9-10.1c CC.W.9-10.4 Grade 11-12 CC.RI.11-12.6 CC.SL.11-12.1d CC.W.11-12.4	Analyzing Applying ideas to solve problems Engaging in collaborative conversation Evaluating

Lesson Matrix Grade 9-12

3R's of the Common Core

Lesson	Leading Question	Objective	Common Core Alignments		Skills
9-12 Recycling Paper Pollution III.B.1	Does recycling solve all our solid waste problems?	Investigate methods of recycling paper and the technical problems encountered in the recycling industry	Grade 9-10 CC.RST.9-10.3 CC.SL.9-10.1c CC.W.9-10.7 CC.HSS.ID.1	Grade 11-12 CC.RST.11-12.3 CC.SL.11-12.1d CC.W.11-12.7 CC.HSS.ID.1	Carrying out investigation Communicating solutions Interpreting Researching
9-12 Collecting and Sorting III.B.2	What kind of recycling program would be best for our town or our school?	Understand some of the design considerations of establishing a recycling facility Use the information to design a hypothetical recycling center for their town or school	Grade 9-10 CC.RI.9-10.7 CC.SL.9-10.2 CC.W.9-10.4 CC.HSG-MG.3	Grade 11-12 CC.RI.11-12.7 CC.SL.11-12.2 CC.W.11-12.7 CC.HSG-MG.3	Applying mathematical concepts Designing Gathering information Problem solving
9-12 Speaking for Recycling III.B.3	What do we need to know about recycling?	Become more familiar with recycling and solid waste management issues Develop their public presentation skills	Grade 9-10 CC.RI.9-10.8 CC.SL.9-10.4 CC.W.9-10.2	Grade 11-12 CC.RI.11-12.8 CC.SL.11-12.4 CC.W.11-12.1	Communicating information Researching Sharing research and writing Synthesizing
9-12 The Cart Before the Horse? III.B.4	Why isn't everybody recycling?	Consider ways to reduce waste in the United States	Grade 9-10 CC.RI.9-10.7 CC.SL.9-10.1 CC.W.9-10.4	Grade 11-12 CC.RI.11-12.7 CC.SL.11-12.1 CC.W.11-12.1	Analyzing Engaging in collaborative conversations Gathering information Using evidence
9-12 Microorganisms III.C.1	Can you identify microorganisms responsible for the composting process?	<ul style="list-style-type: none"> Relate the importance of healthy microorganism activity to composting 	Grade 9-10 CC.RST.9-10.3 CC.SL.9-10.1 CC.WHST.9-10.4	Grade 11-12 CC.RST.11-12.3 CC.SL.11-12.1 CC.WHST.11-12.4	<ul style="list-style-type: none"> Carrying out investigations Collecting and interpreting data Observing Predicting
9-12 Effective Fertilizers III.C.2	What are fertilizers made of?	Rate the effectiveness of various organic and inorganic fertilizers	Grade 9-10 CC.L.9-10.6 CC.SL.9-10.1 CC.WHST.9-10.4	Grade 11-12 CC.L.11-12.6 CC.SL.11-12.1 CC.WHST.11-12.4	Carrying out investigation Hypothesizing Interpreting data Observing

Concept

Natural resources are limited.

Objective

Students will compare estimated life expectancies of some nonrenewable natural resources and will understand the role recycling and careful use play in meeting the demand for the extending availability of these resources.

Method

Students will complete worksheets and discuss.

Material

Attached charts and worksheets.

Subjects

Environmental Science, Social Studies, Language Arts

Skills

Applying ideas to solve problems, explaining, interpreting data, predicting outcomes

Time

One class period

Vocabulary

Nonrenewable resources, static use, life expectancy, reserve base

Resources

Donella and Dennis Meadows, *Limits to Growth*; Cynthia Pollack, "Mining Urban Wastes: The Potential For Recycling," Worldwatch Paper 76

3R's of the Common Core*Parallel Activities*

K-3, Machine

4-6, What Kind of Waste Am I?

7-8, School Trash Analysis

Information

The Solid Waste Stream

Resources

General

How Does Waste Affect Our Natural Resources?

**Background**

Despite occasional drops in the market, the global demand for and consumption of most major nonfuel mineral commodities continues to rise. There is a limit to how long an increasing population can continue to make increasing demands on our finite resources. Concentrated, easily mined reserves of nonrenewable resources are being depleted. The availability of these resources can be extended by careful use and recycling.

Leading Question

How long will our natural resources last?

Procedure

1. Distribute copies of the chart Selected Nonrenewable Natural Resources: Their Life Expectancies and Prime Consumers. Have students complete the worksheet and/or discuss the questions in class.
2. Discuss Alternate Depletion Patterns For a Nonrenewable Resource.
 - How can we determine how long a given resource might last?
 - Any projections are based on two major set of assumptions: We must estimate the potentially available supply at existing (or future) acceptable prices and with existing (or improved) technology and we must estimate the annual rate at which the resource may be used.

Evaluation

What could be some effects of population growth, natural disasters, disease, and advanced technology systems on resource availability? What are some advantages and disadvantages of using renewable resources in place of nonrenewable resources?

Common Core Alignments

GRADE 9-10

CC.L.9-10.6

Language:
Vocabulary Acquisition & Usage

CC.RST.9-10.7

Reading in Science & Technical Subjects:
Integration of Knowledge & Ideas

CC.SL.9-10.2

Speaking & Listening:
Comprehension & Collaboration

CC.W.9-10.4

Writing:
Production & Distribution of Writing

GRADE 11-12

CC.L.11-12.6

Language:
Vocabulary Acquisition & Usage

CC.RST.11-12.8

Reading in Science & Technical Subjects:
Integration of Knowledge & Ideas

CC.SL.11-12.2

Speaking & Listening:
Comprehension & Collaboration

CC.W.11-12.4

Writing:
Production & Distribution of Writing

Selected Nonrenewable Natural Resources: Life Expectancies & Prime Consumers (2007)

Resource	*Reserve Base	Countries with highest reserve base	Countries with largest production	Largest consumer	**Life expectancy at current rate	Life expectancy at US consumption rate	recycling rate
Bauxite	32,000,000	Guinea, Australia, Jamaica, Brazil	Australia, China, Brazil	China	1027	510	49%
Copper	940,000	Chile, United States, China	Chile, Peru, United States	China	61	38	31%
Gold	90,000	South Africa, Australia, Peru, China	Australia, South Africa, China	India, China	45	36	43%
Iron Ore	340,000	Ukraine, Russia, China	China, Brazil, Australia	China	N/A	N/A	N/A
Lead	170,000	Australia, China, United States	China, Australia, United States	China	42	8	72%
Silver	570,000	Poland, China, United States	Mexico, Peru, China	United States, India, China, Russia	29	9	16%
Tin	11,000,000	China, Brazil, Malaysia	China, Malaysia, Indonesia	China	40	17	26%
Chromium	N/A - exceeds 12 billion tons	Kazakhstan, South Africa	South Africa, Kazakhstan, India	China	143	40	25%
Platinum	80,000,000	South Africa, Russia, United States	South Africa, Russia, Canada	EU	360	42	0%

Sources: "Minerals Resources Program," US Geological Survey, accessed June 13, 2016, <http://minerals.usgs.gov/>.

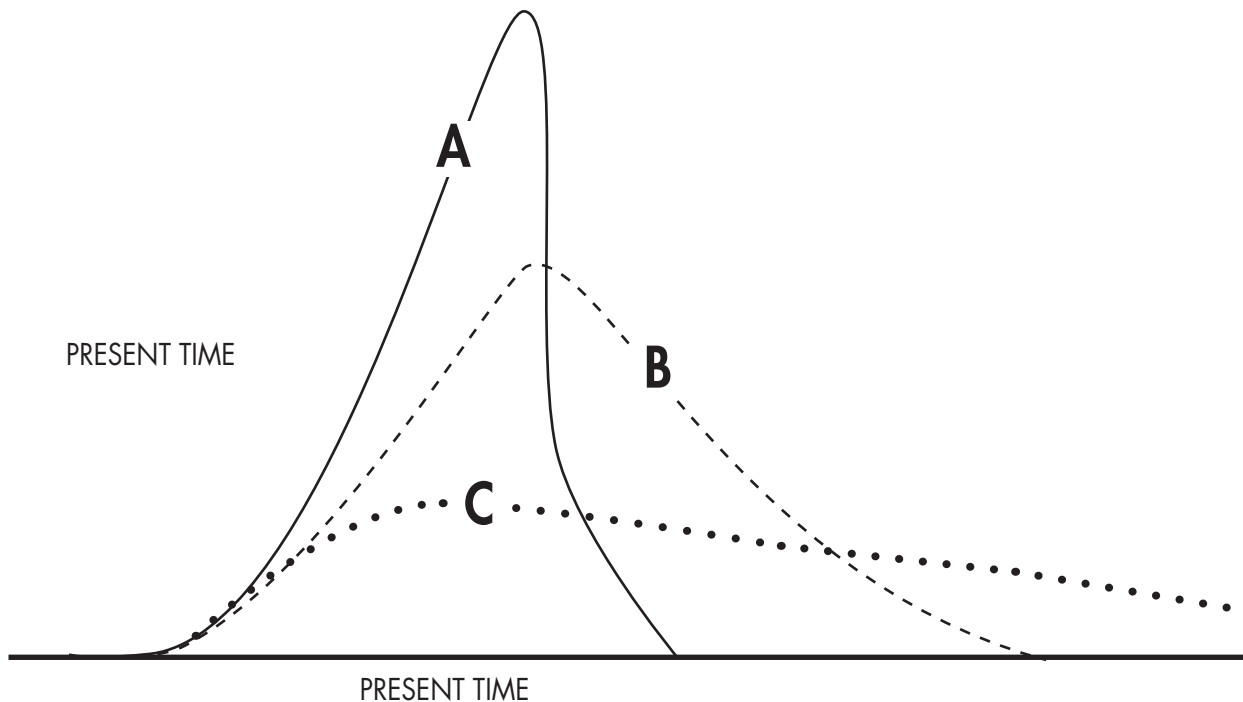
"Peak Energy & Resources, Climate Change and the Preservation of Knowledge," Energy Skeptic, accessed June 13, 2016, <http://energyskeptic.com/2013/how-long-will-minerals-last/>

*All weight is in dry metric tons

**Life Expectancy is very subjective and cannot be accurately determined due to constant fluctuations in the markets, changing technologies and political climates.

Alternate Depletion Patterns for a Nonrenewable Resource

- A. Mine, use and throw away
- B. Recycle, improve mining technology to damage the environment less and use less concentrated mineral deposits
- C. Recycle



SOURCE: Modified after Hubbert and Cloud.

“There is no danger whatever of humanity ‘running out’ of non-fuel mineral resources and I have not said there is. Humanity is not destroying them.

What will run out, however, is the capacity of the environment to absorb the punishment associated with mining ever-lower grades of ore or reconcentrating what is already dispersed. Secondarily, the ability to do the job at an attractive cost will also ‘run out.’”

– Paul Erlich

Name: _____ Date: _____

Examine the chart Selected Nonrenewable Natural Resources: Their Life Expectancy and Prime Consumers. Then answer the following questions.

1. Which Life Expectancy in Years, current global rate or US rate, do you think is more accurate in estimating the length of time our nonrenewable natural resources will last?
2. What are some factors leading to the accelerated use of resources?
3. Examine the column under the heading Life Expectancy in Years. Which nonrenewable natural resource will be used up first?
4. Which countries have the highest reserves of the resource from question 3? Locate these countries on a world map.
5. Why does the United States need to be concerned with the depletion of this resource?
6. Which nonrenewable resource will last the longest according to the table?
7. Which countries have the highest reserves of this resource?
8. Which countries will the United States need to cooperate with in order to get the amount of this resource it needs?
9. List the resources that will probably be used up within the next 40 years given global usage rates.
10. What role do recycling and careful use play in extending the availability of these resources?

We found this on Pinterest, at Lifehacker.com

Make a Storage Capsule Out of Two Plastic Soda Bottles

By David Galloway

Filed to: Outdoors10/08/11 2:00pm



Backpackers often buy small lightweight containers to avoid lugging around full-size bottles of soap, condiments, sunblock, and many other substances. Save some money by making airtight, waterproof, and lightweight containers from the tops of two soda bottles. You'll probably find a use for these even if you aren't a backpacker.

Backpacking blogger JJ Mathes details the construction of these containers at the link below (no longer available). All you basically need to do is cut two plastic soda bottles just past the point where the screw-cap threads end and glue them together. If you want a two compartment capsule, measure and cutout a circular piece of plastic from the bottle's sidewall.

I especially like the idea of using the two-compartment capsule for salt and pepper or two different daily medications. These would also be great to bring cooking oil, garlic cloves, and other cooking odds and ends when camping; perhaps even a couple of shots of your cordial of choice for a mountaintop toast.

CLUB note: While the original link was missing, we found this [YouTube video](https://www.youtube.com/watch?v=sJC4ngQvQNY) that gives you all the instructions. (<https://www.youtube.com/watch?v=sJC4ngQvQNY>)