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Environmental Responsibility

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Everywhere today we hear things about the environment. Our schools and cities are making serious efforts to recycle. Our states are passing legislation to help handle waste and prevent future pollution. Our country's president and vice president are very much concerned with preserving natural resources and finding ways to clean up air, water, and land pollution. Then there is a seemingly endless list of environmental groups that range from local grassroots to international. All are trying to work out ways to help solve our environmental problems.

The issues are complicated, but some things have become clear. One thing that has become clear is that our current consumer habits are causing major environmental problems.

I have taught consumer math for the past six years. We have worked almost exclusively with money matters. This unit has been written as a way of bringing environmental considerations into the consumer math curriculum. Its purpose is to develop environmental responsibility by increasing our awareness of the link between everyday choices and major environmental problems. The unit is made up of five activities. It will take two to three weeks to complete.

Content of Unit

III. Reference Section

Activity #1: Writing and Working with Mini-Studies On Environmental Issues

This activity consists of students independently doing five environmental mini-studies then working with the mini-studies, first in small groups and then with the entire class. The purpose of writing and working with the mini-studies is to provide the needed background for the rest of the unit. The topics are: (1) the water cycle and water pollution, (2) energy, (3) air pollution, (4) discard management, and (5) wilderness destruction. This activity will take two or three class periods. If videos are used, it will take longer. The videos are listed in the appendix, which gives notes for the mini-studies.

The mini-studies need to be done prior to beginning the unit, so about a week or two before starting the unit students will need to know about the unit, be given the mini-study assignment, and participate in a mini-study class demonstration. (See mini-studies below.)

There are four steps to this activity. Each one builds on the previous one.

* Students individually do mini-studies on (1) The Water Cycle and Water Pollution, (2) Energy, (3) Air Pollution, (4) Discard Management, and (5)Wilderness Destruction.
* In small groups, students work on developing one of the mini-study areas and preparing a report on it.
* Groups present the mini-study reports to class.
* Class discusses activity and writes a one-page summary of the most important ideas.

Mini-Studies

The mini-studies are very important because they get each student actively involved and provide the material for the first two days of class work. Each mini-study is one-page long and consists of an illustration and two or three paragraphs of information on the topic. Students can use textbooks, encyclopedias, articles from newspapers or magazines, and even discussions. In doing a demonstration mini-study together, students are given a copy of an encyclopedia and one other article on a related topic to read. Key facts are listed on the chalkboard, an illustration sketched, and two or three paragraphs written from the information given and general life experiences. For an example of a mini-study see Figure 1: The Carbon Cycle.

The mini-study topics were chosen for specific reasons. The water cycle and water pollution topic was chosen because it is easy to visualize the water cycle as a cyclic, globally moving system and see how the pollution of water can occur and spread. Energy was chosen because it is basic to all life and everything we do and yet the ways we currently produce and use energy cause serious environmental problems. Air pollution was chosen because it includes the important problems of upper atmosphere ozone depletion, global warming, acid rain, and smog. Discard management was chosen because it addresses the problems of limited resources and waste. Wilderness destruction was chosen because an awareness of what wilderness is, the manner in which it is being destroyed, and what is being lost to the world can offer us a new perspective on who we are and

where we are heading.

Within each area of study we find serious environmental problems caused and supported by certain consumer habits, basically excessive consumption and lack of concern for pollution. Also, within each area of study, there is for most of us a lack of understanding of the full consequences of these habits and of the alternate choices that exist.

Notes on each of the mini-study areas are given in the appendix. These are given to provides a background and focus for getting started. Going beyond the notes, three books, Joel Makower's The Green Consumer and The Green Consumer Supermarket Guide and Paul Ekins' The Gaia Atlas of Green Economics, provide a mass of information and background. Makower's books give a lot of information on environmental problems and evaluating consumer products. Ekins' book discusses environmental problems and puts them in a global economic-environmental perspective. All three books have extensive lists of references with names and addresses for further information and action.

Figure 1: The Carbon Cycle

An example of a student mini-study.

(figure available in print form)
Carbon is found in the earth's air, water and land. It is also part of all living plants and animals. There are many complex carbon cycles, but the one we probably are most familiar with is the exchange between plants and animals. Animals take in oxygen (O2) and put out carbon dioxide (CO2). Plants take in carbon dioxide and put out oxygen.

In order to support life, the earth's atmosphere has to have a certain ratio of carbon to other elements. Today this ratio is being destroyed because thousands of tons of carbon dioxide and other pollutants are being dumped into the air from the burning of fossil fuels in motor vehicles and industries. When this happens the air becomes unhealthy and people can have trouble breathing, develop diseases and even die from it. In the U.S. we have 4.9% of the world's population but put out 21.9% of the worlds CO2 emissions. [19]

The consumer habits that most contribute to the disruption of the carbon cycle are (1) excess use of motor vehicles and power (electricity and heat) and (2) consumption of material goods beyond what is a healthy need and desire.

Plans for First Class

The five mini-studies are due the first day of the unit. At the beginning of the class, a brief overview of the unit's five activities is given and what is expected for each student to have completed by the end of the units carefully spelled out. The rest of the class will be spent as follows.

* Students divide into five groups.
* Each group is assigned one of the mini-study topic .
* Students read each other's mini-studies on the topic assigned to his or her group.
* The group prepares a report for its topic.

Depending on the topic and students involved, the group reports can be simple with just discussion and chalkboard illustrations or more elaborate using articles, worksheets, and the overhead projector.

Plans for the second and possibly third day

* Groups give reports to class. Students listening add information to their mini-studies on the topic being reported on.
* Class discusses activity and writes a one-page summary of the most important ideas.

Activity #2: Evaluating Consumer Products

The evaluating consumer products activity will take about three class periods. It consists of the following.

* Students and teacher bring in a variety of consumer products. Products are needed for each of the following four categories: food and drink, personal care, cleaning supplies, and miscellaneous.
* Class discussion of guidelines and reference books to be used for help in evaluating products.
* Students individually evaluate four products, one from each of the four categories, and fill out a worksheet for each.
* Class divides into four groups, one for each of the product categories.
* Each group prepares report on the products in its category.
* Groups give reports.
* Class discusses activity and writes a one-page summary of the most important ideas.
Suggestions for creating a Product Pool.

Items are needed for four categories.

Foods and drink such as soda, milk, soup, cereal, cake mix, package of apples, vegetables.
Personal care products such as toothpaste, deodorants, shampoo, hair spray, lotions.
Cleaning products such as glass cleaners, laundry detergents, dish washing liquid, furniture polish, tile cleaners, cleanser.
Miscellaneous such as car oil, toys, audio tapes, books, shirt, flashlight.

It would be more useful for evaluating purposes if the items had different kinds of containers such as aerosols, pump bottles, pour bottles, squeeze tubes, etc., for the first three categories. 1

Books to use as part of this activity

Joel Makower's *The Green Consumer* and *The Green Consumer Supermarkets Guide* , mentioned in the first activity, give both background and guidelines for evaluating products. The supermarket guide uses brand names and list several of the best and worst in each category. For example if you were going to buy a particular box of cereal, you would look up cereal and it gives three paragraphs of general information and then list by brand name the best and worst choices for environmental considerations. In *Clean and Green* , by Berthold-Bond, formulas are given for making your own cleaning solutions from natural, healthful, and environmentally safe substances. Students probably would find it interesting to see that there exists simple, natural alternatives for many of the toxic or polluting cleaning products. For example it gives a formula for a copper cleaning paste made from salt, flour and vinegar. It tells you how to make the paste and use it. I tried it. It works well, but it does takes a little more rubbing. *Clean and Green* also list environmentally safe cleaning products.

The last book to be mentioned here is The Council on Economic Priorities' *Shopping For A Better World* . This book evaluates 186 companies that produce over 2100 products in ten areas: charitable giving, animal testing, women's advancement, South Africa (investments), minority advancement, the environment, community outreach, family benefits, disclosure of information, and workplace issues. As an example, I looked up Ronzoni. It is owned by Hershey Foods Corporation and has top rating in all categories except in charitable giving. Here it received a middle rating. It also has on-sight day care for workers. It took maybe 30 to 60 seconds to look up and glance across the page at the ratings.

Packaging

Some packaging statistics.

* Packaging accounts for 50% of all paper produced in the United States, 90% of all glass, and 11% of aluminum. [2]
* Americans throw away 2.5 million plastic bottles every hour. [3]
* Up to one million sea birds and one hundred thousand marine mammals are killed each year by plastic trash such as fishing gear, six-pack yokes, sandwich bags, and Styrofoam cups. [4]

Packaging From Best to Worst [5]

Best: no packaging at all
Very Good: minimal, recycled, and recyclable packages; concentrated products; endlessly refillable packages; reusable, refillable, and recyclable packages
Good: packages made of recyclable, but not recycled, material; packages made of recycled, but unrecyclable material

Fair: packages made from partial recycled content; products packaged in multiple layers of recyclable packaging
Bad: products packaged in multiple layers of unrecyclable packaging; single-serving containers; aseptic packages; aerosol cans
Worst: packages made of composite materials

Plans for First Class

Prior to beginning class work, the products pool needs to be gathered. At the beginning of class go over use of the four books mentioned in the reference above, possibly going over the packaging sections in Makower's books and the environmental and other ratings of companies and products by the Council on Economic Priorities. Go over worksheet, which is given below. The rest of the period would go as follows.

* Students individually evaluate four products, one from each category, and fill out a worksheet for each.

Plans for Second and Third Days

* Class divides into four groups, one for each product category.

* Each group prepares a report of its findings for its category of products.

* Groups give reports.

* Class discuses activity and writes a one page summary of important ideas.

Product Evaluation Worksheet

Name Item Date

_____ _____ _____

1. What are the three main ingredients or materials of your product?
2. Is there a word in the list of ingredients or elsewhere on the label or packaging that you do not understand? If so, what is it? Use a dictionary and find its meaning. An unabridged dictionary may be needed.
3. What is the quantity of the product? (Give the smallest units such as 1 lb 4 oz = 20 oz.)
4. What is the price?
5. What is the price per unit (PPU)?

6. What kind of delivery system, box, tube, jar, etc., does your product have?
7. When your product is used, does it do harm to you or the environment?
8. Rate the packaging using the best, very good, good, fair, bad, and worst criteria given.
9. What happens to the package once it is thrown away?
10. All products have an environmental impact. What is this product's environmental impact?
11. Does the company that makes this product have a good environmental record?
12. Put comments on back of this paper.

Activity #3: Working With Global Warming Data

This activity will take one day and a homework assignment. The purpose for doing it is to use the average annual temperature data for two cities to see if the data supports global warming theory.

Plans

* Explain activity and the purpose for doing it
* Each students receives a copy of data in Figure 2.
* Together in class, each student graphs the average annual temperatures for Charleston, SC for the years 1920 through 1970
* Students fit a line to the data. [8]
* Determine if the Charleston data supports the global warming theory
* For a homework assignment, students graph the average annual temperatures for New Haven, CT for the years 1920 through 1970, fit a line, and determine if the data supports the global warming theory.

Figure 2: Average annual temperatures for Charleston, SC and New haven, CT for 1920 through 1970.
(figure available in print form)

Activity #4: A Water Conservation Problem

This activity will take about 1 or 2 class periods.

It requires a piece of water hose that will attach to an available sink faucet and a showerhead, a traditional showerhead, a water saving showerhead, and a worksheet. The steps are as follows:

* Each student estimates how much time is spent in showering per week and per year
* In small groups students measure the amount of water used per minute for a regular shower head and a water saving showerhead.
* Each student determines how much water he or she would use a year showering with each type of showerhead.
* Assuming a difference, determine the amount and percent of water saved using one showerhead over the other
* Extension: determine cost of water
* Extension: determine cost of heating water

Plans:
Get showerheads and hose, introduce project, and follow steps on worksheet. The following information could be helpful in planning the activity's introduction.

Conserving water is a good "think globally, act locally" kind of thing because it is easy to see how extra water that is saved by not being used can be in the Mill River today, move into Long Island Sound in a matter of minutes, and be out in the ocean tomorrow.

Why conserve water? If we consider all the water on earth, about 97% is locked in salt-water ocean and coastal seas like Long Island Sound. Of the 3% fresh water left, more than 2% is locked in polar glaciers and ice at the poles. [9] That leaves less than 1% of fresh water available to us, and not all of that is easily available anymore because of pollution and heavy industrial, agricultural, and farm use.

Further, by conserving water we decrease the amount of water that needs to be processed, which saves energy and money, and allow more water to remain in lakes, rivers and streams, where the greater volume and faster movement lessens the pollution impact and makes more water available for wildlife and recreation. Using less also minimizes the need to build new dams and reservoirs.

How Water is Used in Our Homes [10]

(figure available in print form)

Many ideas on how to save water are given in the two Makower books mentioned above and in the Connecticut Water Conservation Handbook. [11]

A Water Conservation Problem

Name Date _____ _____

SHOW ALL MATH WORK. USE BACK AS NEEDED

1. Estimate on the average how long you take to shower.
2. Estimate about how many times a year you shower.
3. Estimate the amount of time you spend each year in the shower.
4. With your group, use shower head A, the traditional showerhead, and determine how much water flows through it in one minute. Try it twice and use the average.
5. With your group, use showerhead B, the water saving showerhead, and determine how much water flows through it in one minute. Try it twice and use the averages.
6. How much water would you use in a year using the traditional showerhead?
7. How much water would you use in a year using the water saving showerhead?
8. Assuming there is a difference, how much water would you save using the water saving showerhead? What is the percent of savings?

Activity #5: Developing Environmental Responsibility

Developing Environmental Responsibility will take two or three class periods. If the videos *The Wilderness Idea* and *The Garden of Eden* are used here, it will take longer. This activity is the last in the unit and consists of the following steps.

* Students keep a four day environmental record
* Students each analyze four quotations—two paragraphs each
* A class discussion on journals and quotations
* Students each write a one page personal statement on their environmental responsibility
* The completed environmental unit with all the work done and a cover with an appropriate drawing or illustration to be handed in.

Environmental Journals

Students keep track for four days of the following things: (1) what activities they do, especially noting use of electricity, water, gas, and gasoline, (2) what they eat, noting the packaging, (3) what they buy, noting the packaging, and (4) how they travel to different places. Students seem to do better at keeping a record if they have a form to work with so a worksheet may be useful for this.

Analyze Four Quotations

Each quote is put on a separate page. Lines are made to the bottom of the page for students to write on. The assignment is to write two legible, coherent paragraphs: one paragraph explaining the meaning of the quotation, the second one on what the students think about the subject of the quotation. Four possible quotations are given below.

Four Quotations

1st Quote: Product Lifecycle Analysis12

Increasingly consumers are demanding to know about, and companies being expected to take responsibility for, a product's environmental impact over its entire life cycle—from the raw materials and their extraction, through the manufacturing process, the packaging and distribution of the product, to its use and final disposal. At each stage, consideration needs to be given to the implications for sustainability of the resources used, renewable and nonrenewable; the emission of wastes and pollution caused; the impact on global services , such as climate and the ozone layer, or wildlife, biodiversity, and ecosystems; and on the health, beauty, and amenity of the local environment. Aggregated across industry as a whole, these impacts must be brought within clear sustainability standards covering the entire range of environmental functions, formulated by applying the precautionary principle (see next quote) to the best available scientific knowledge.

Paul Ekins

Green Economics

2nd Quote: The Precautionary Principle [13]

The 1990 intergovernmental conference on the environment in Bergen, Norway, articulated this political principle in environmental management:

Policies must be based on the precautionary principle. Environmental measures must anticipate, prevent, and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Bergen Ministerial Declaration

3rd Quote: David Cayley14

We live at an apocalyptic moment, a moment when the fate of our civilization is revealed, and fundamental

choices are posed.

4th Quote: Chief Seattle of the Duwamish Tribe 185515

What is man without the beasts? If all the beasts were gone, men would die from a great loneliness of spirit. For whatever happens to the beasts, soon happens to man. All things are connected. Whatever befalls the earth, befalls the sons of the earth . . . If men spit upon the ground, they spit upon themselves . . . Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself.

Class Discussion on Journals and Quotations

Some possible questions for starting a discussion on student journals would be: Considering lights, TV and other electrical appliance, how careful are you to not waste energy? Explain. Considering packaging, quality, all factors, how would you rate yourself on food? Explain.

Are you careful with the use of water? Explain. What are your strongest environmental areas? Where are your weakest?

For starting a discussion on quotations the format might be to ask different students to read or state their understanding of what was being said in a particular quotation (first required paragraph) and then ask students to read their views of the area under consideration (second required paragraph).

To develop background for this activity, *The Age of Ecology* by David Cayley could be helpful. Between 1986 and 1990, Cayley interviewed many of the world's leading thinkers and activists on the CBC Radio show *Ideas* . Quoting from the book's back cover, "This book offers a wide range of challenging ideas drawn from all parts of the globe on the most important questions facing humanity today." This is an accurate description of *The Age of Ecology* .

Any or all of the books mentioned earlier in the unit would also be helpful, but *Green Economics* might be the best of those for this task because of its humane and global perspective.

Personal Environmental Philosophies

These should be one page statements that legibly and coherently state the students position on her or his environmental responsibility. If a student says, "I'm an unconcerned citizen," as a student once said to me, then that is the position to be explained.

Completed Unit

Students are to hand in all the completed mini-studies, one page class summaries, product evaluation sheets, graphs, water problem worksheet, journal sheets, quotation worksheets, and their one page environmental responsibility statement. These need to be put order and a cover with an appropriate drawing or illustration included.

II. Appendix: Notes For Mini-Studies

The following notes are to provide some background and focus for getting started in the five mini-study areas. They are in no way comprehensive, but are given only to help get into the work of the mini-studies.

It is important to remember that the purpose of having students write and work with mini-studies is to provide a general background of information to use throughout the unit. Students will bring in different material for the topics and from this the work in each area will develop.

Mini-Study #1: The Water cycle and Water Pollution.

There is a fairly constant supply of water on earth and it moves about constantly in what is referred to as the hydrologic cycle. Water flowing and circling around the earth illustrates the interconnectedness of all things. It also illustrates how easily pollution can encircle the earth.

About 2/3 of the earth is covered with water and less than 1% is available to us as fresh water. According to one estimate, that is about 9,000 cubic kilometers, which is enough to sustain about 20 billion people. 16 That's the good news. The bad news is that it is not evenly distributed and it is being badly polluted.

Polluted water makes people ill, kills fish, destroys rivers and lakes, ruins animal habitats, decreases the quality of drinking water, destroys recreational areas, and decreases the quality of life at all levels.

Some of the major causes of water contamination are sewage, hazardous waste, leakage from landfills, agricultural practices, farm factories, effluent from industries and leakage from underground storage tanks.

About 50% of the U.S. population depends on groundwater for drinking water. Increasingly new sources of groundwater pollution are being reported. Our primary sources of groundwater pollution are as follows. [17]

192,000 Surface impoundments (ponds, pits, and lagoons which have been built to store waste-many of them hazardous wastes)
9,000 municipal landfills
280 million acres of cropland treated with pesticides
50 million tons of fertilizers/year
23 million septic tanks
10 million tons of dry salt applied to highways/year
5 million underground storage tanks, underground injection wells oil and drilling operations

There are two areas of focus for consumers, conservation of water and keeping water clean. See Activity #4: a

Water Conservation Problem for reasons why we want to conserve water. Suggestions to prevent polluting water are as follows. (1) Don't empty pollutants from home into drains or outside in the yard. Things like paint, toxic cleaners, and motor oil should be disposed of in the city's hazardous waste collection. (2) Buy products that don't pollute. This may require research. (3) Read labels. (4) Report pollution.

Mini-Study #2: Energy

Some of our current energy concerns are (1) the impact on the environment from extracting fossil fuels and generating energy, (2) the amount of greenhouse gases produced in energy generation, (3) limited amounts of fossil fuels and uranium, (4) dependence on other countries for fuel, and (5) the claim of future generation for the resources we are using.

For environmental purposes, it is important to keep in mind that energy can be produced from either renewable sources such as solar, wind, water, and wood, or nonrenewable sources such as oil, gas, coal, and uranium. Norway uses 100% renewable energy sources to produce its electricity. At the other extreme, Denmark uses only 1% renewable and 99% nonrenewable (99% fossil fuel) for their electricity. The U.S. uses about 6% renewable and 94% nonrenewable (20% nuclear and 74% fossil fuel).

Mini-Study #3: Air Pollution.

Air pollution in general is caused by the thousands of tons of toxins that are dumped into the air each year primarily from motor vehicles, power plants, and other industries including farming and agriculture. It causes illness and death in people, damage to trees and wildlife, and corrodes buildings and other structures.

Ozone depletion , acid rain, and global warming are three aspects of air pollution commonly talked about today. Students mini-studies on air pollution might include information on any of these.

Ozone deletion refers to the fact that the ozone layer, which is about seven to fifteen miles above the earth's surface, has been thinning to the point that holes have developed. This is believed to be caused primarily by chlorofluorocarbons (CFCs) which are widely used in refrigeration, air conditioners, Styrofoam, solvents and as propellants in aerosols. The gas halon, less well known but even more destructive to ozone, is also a cause. Halon is used primarily in fire extinguishers.

Near earth, CFCs are relatively inert. But when not properly disposed of, as happens when refrigerators and cars with air conditioners are dumped into landfills, the CFCs escape into the air and slowly rise, taking any where from 10 to 100 years, until they penetrate the ozone layer. At this point they become radiated by the sun's energy and actively begin destroying ozone molecules.

The reason for concern is that the ozone layer acts as a filter and filters out the sun's harmful ultraviolet rays. As the layer gets thinner, more UV rays reach earth and are believed to be causing an increase in skin cancer and cataracts in people, possibly similar effects in animals, and diseases in plants. [20]

Johnson and Sons has produced a video called *Ozone: The Hole story* . It explains what the ozone problem is, its cause, the increase risks related to it, and discusses ideas on easing the problem. However, it also is an example of how industry can skew facts and make suggestions that mitigate the problems their products cause.

Acid Rain . Acid rain is caused by sulfur dioxide and nitrogen oxides from the burning of fossil fuels. Once they are emitted into the air, they mix with moisture and become sulfuric acid and nitric acid. The effects of this

are an increasing threat to human health, acidification of lakes with loss of fish and wildlife, die-back of forests, stunting of crops, and corrosion of buildings.

Global Warming refers to the idea that the Earth's atmosphere is increasing in temperature. Even though the earth's average global temperature has stayed fairly constant for thousands of years, some scientists are predicting an increase of 4 to 9 degrees in the next 70 years.

If this does happen, some possible results would be the melting of the polar glaciers, a rise in sea level of 5 feet, coastal flooding, and significant change in climate conditions. The cause of global warming is the increase of motor vehicle and industrial waste being put into the air.

Mini-Study #4: Discard Management.

As a culture we are producing and consuming so much so fast and in such a careless way that we can't get rid of what we have produced fast enough. Our landfills are being filled to capacity and no one wants a new landfill to be placed near where he or she lives. Landfills have had all kinds of hazardous waste dumped into them and some of the hazardous waste seeps into the ground water and water systems on which people depend for drinking water. Spent nuclear rods take something like 500,000 years to become safe. Hauling garbage away is expensive. Pollution of rivers and streams kills fish. Most of our current landfill methods do not allow garbage to decay so much of it is being preserved. The problems of trying to disposal of solid waste are many. However, that's the bad side of the story. Today a lot is being done to decrease waste and pollution and save resources. Some points to be made in this area are as follows.

Consider the terms "garbage," "trash," and "waste." They all have a negative connotation and imply a lack of value. Discards imply things people no longer want. The things could or could not have value. Discarded resources implies a reserve, supply, a store of things or stuff that people no longer want. So discard management refers to the handling or controlling of what we discard, or no longer want. It more accurately represents what is starting to happen today than the phrase "solid waste management."

Another point to consider is that garbage is something we manufacture. A Coke can in your hand isn't garbage, it's an aluminum can. When you throw it into a waste basket with all kinds of other discarded things, then it becomes garbage.

The Green Consumer movement even has its own "Three R's," and for some even 'Four R's." [21]

1. Refuse—to buy wasteful and polluting products
    - this is where green power is the strongest
    - is also known as precycling
2. Reduce—How much is enough?
    - How much packaging, junk mail, toys, and gadgets do we need?
    - How much credit and debt can we afford?
3. Reuse—buy products with the longest life possible so they can be reused over and over
4. Recycle—After we refuse, reduce, and reuse, a high percentage of what is leftover discard should be recyclable

Why should we recycle? To save material, energy, and the cultural value of things. It also creates more jobs to recycle than to make new. It saves money too.

If after refusing and reducing we have things to dispose of, the choices we have are to reuse, recycle, landfill or incinerate.

Mini-Study #5: Wilderness Depletion.

Wilderness depletion is probably the most difficult for many of us to understand because so few of us are exposed to real wilderness. By its very nature the wilderness is not controlled by humankind but operates on its own natural laws. Two videos that clearly and beautifully portray the wilderness sense and struggle are *The Wilderness Idea* and *The Garden of Eden* .

The Wilderness Idea is a video documentary that portrays the first great wilderness battle between John Muir and Gifford Pinchot over whether the Hetch Hetchy, a valley within Yosemite National Park, should be dammed and flooded to form a reservoir for San Francisco. This battle took place in the early part of this century.

A second documentary, *The Garden of Eden* , portrays a current wilderness battle to save a Florida forest which housed rare species of plants and animals and some that are found no where else. It interviews the environmentalists, community people, and an electrical company executive as the drama unfolds as to whether or not the new power plant would be built as scheduled in the Garden of Eden.

The rainforest destruction which we hear so much about is part of the deeper, more general problem of wilderness destruction. The destruction of the rainforest is caused by many factors: the clearing of the forest to support cattle and cash crops to pay off debt, poor government planning, poorly planned attempts to satisfy demands for land reform, a demand for tropical wood and the clearing of the forest by people trying to subsist by farming land that is not suited for it.

The destruction of the rainforest causes many problems. The rainforest are home for many people and a large variety of animals and plants found nowhere else on earth. They are major climate regulators and a source of many medicines, seeds, herbs, rubber, and a vast number of yet unknown plants, insects, and animals.

But wilderness destruction is worldwide. In the U.S. we have destroyed over 80% of our natural forest and almost all of our great plain natural prairies. As a people we are only now beginning to understand what this means.

Notes

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1. SC Johnson Wax, *Smart Shopper Crew* .
2. Jeremy Rifkin, *The Green Lifestyle Handbook* , 25.
3. ibid., 26
4. ibid., 28
5. Joel Makower, *The Green Consumer Supermarkets Guide* , 43.
7. U.S. Dept. of Commerce, *Historical Statistics of the United States Part I* , Bureau of the Census, Washington,

D.C., 1975, 446.
8. For a simple description of how to fit a line see *Exploring Data* , the teacher's edition, by James M. Landwehr and Ann E. Watkins, Dale Seymour Publications, 1987, 112-118.
9. Regional Water Authority pamphlet *Save The Earth Conserve Water*
10. Regional Water Authority pamphlet Connecticut Water *Conservation Handbook*
11. ibid.
12. Paul Ekins, *Green Economics* , 95.
13. ibid., 154.
14. David Caley, *The Age of Ecology* , viii
15. Andee Collard and Joyce Contrucci, *Rape of the Wild* , 24.
16. Joel Makower, *The Green Consumer* , 33.
17. Regional Water Authority Booklet *Groundwater* , 6.
19. Paul Ekins, *Green Economics* , 88.
20. SC Johnson Wax, Ozone: *The Hole Story* , video.
21. Joel Makower, *The Green Consumer Supermarket Guide* , 24-27.

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2. Cayley, David. *The Age of Ecology* . Toronto: James Lorimer and Company, 1991. Interviews

with some of the world's leading thinkers and activists on environmental issues. Interviews done Vancouver, CBC Radio show Ideas.
3. Council on Economic Priorities. *Shopping For A Better World* . New York: Ballantine Books, 1992. Gives ratings in ten categories for over 2,1000 products. Supports using dollars to vote. Provides information that otherwise would be difficult for individuals to get.
4. Ekins, Paul. *The Gaia Atlas Of Green Economics* . New York: Doubleday, 1992. Looks at global environmental-economic situation from the perspective of human health and well being.
5. Makower, Joel. *The Green Consumer* . New York: Penguin Books, 1993. Covers environmental problems and relates them to consumer patterns. Guidelines and resources to help make green choices.
6. Makower, Joel. *The Green Consumer Supermarket Guide* . New York: Penguin Books, l991. Evaluates over 3000 products. Offers guidelines for rating products and supermarkets. Gives names and addresses of companies.
7. Rifkin, Jeremy. *The Green Lifestyles Handbook* . New York: Henry Hold and Co., 1990. Filled with data and quotes as it analyzes our environmental problems and gives suggestions for going green and active.

Other Resources

1. Connecticut Resources Recovery Authority. Operates the Mid-Connecticut Project Visitors Center. Offers schools tours of facility. Starting in Sept. 1993 will be lending kits, such as showing how aluminum is recycled, to schools. 211 Murphy Road, Hartford, CT, 06114. (203) 247-4280.

2. Lawrence Hott and Diane Garey. *The Wilderness Idea: First Great Battle For Wilderness* . Florentine Films, 1990. A video about John Muir and his fight to protect the wilderness and Gifford Pinchot and his determination to meet the needs of a growing population. 58 min. Good historical documentary.

3. Lawrence Hott and Roger Sherman. *The Garden of Eden* . Direct Cinema Limited, 1987. An interesting documentary showing why the great variety of the world's species must be protected and how environmentalists, corporations and community people can work together. 28 min.

4. SC Johnson Wax. *Smart Shoppers Crew* . A free packet with poster, teacher plans, and worksheets to help students evaluate products. It is good also as an example of not too subtle, and misleading, advertising put forth as information background for lessons. SC Johnson Wax, 1525 Howe St., M.S. 029A, Racine, WI, 53403-5011.

5. SC Johnson Wax. Ozone: *The Hole Story* . Video, 1992. Good presentation of the ozone problem. It subtly advertises and could be considered alarmist in its presentation of dangers, but this could be used as a good teaching example of these techniques. Three

parts. Lesson plans and worksheets. SC Johnson, Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709-9905, $24.