KEEP PENNSYLVANIA BEAUTIFUL

REQUEST FOR PROPOSAL FOR EDUCATION MATERIALS UPDATE

PROPOSAL ISSUED: December 3, 2021
PROPOSAL SUBMISSION DEADLINE: February 15, 2022

As called for in Pennsylvania's first-ever Litter Action Plan, announced by Governor Tom Wolf on November 22, 2021, Keep Pennsylvania Beautiful is looking for a contractor to update their antilitter curriculum, which focuses on changing littering behavior by influencing positive behavior through education. Keep Pennsylvania Beautiful's comprehensive litter research, the Pennsylvania Litter Research Study and The Cost of Littering and illegal Dumping in Pennsylvania, informed the development of the Litter Action Plan. As part of the Litter Action Plan, our goal is to launch our revised materials publically, in partnership with the Department of Environmental Protection, on Earth Day 2023.

SCOPE OF SERVICES

Background: An education materials review was performed by an independent group of Pennsylvania educators to evaluate and recommend revisions and updates to Keep Pennsylvania Beautiful's collection of education materials with the goal of making them relevant to today's classroom and the various teaching and learning styles and techniques, including in-person and virtual instruction. Recommended revisions will be shared with the awardee.

The scope of work includes revisions to existing materials in two phases. Phase 1 includes requirements a through f. Phase 2 includes requirements a through e.

Phase 1: Update Open Your Eyes to Litter books and teacher's guides and tailor to specific grade levels. Open Your Eyes to Litter is a series of five activity books that provide hands-on learning for grades K through 6 regarding litter and waste handling from prehistoric times to the present.

Phase 2: Revise, reorganize, update and combine materials (Project Trash and Science Curriculum) into one comprehensive tool. Project Trash (Attachment A) is a six-step process that empowers kids to get involved and make a difference in their community. The Science Curriculum, student handbook and teacher's guide, (Attachments B & C) includes ten activities that can be performed individually or as a series and is designed to help students understand the impact of individual choices and actions and implement change. The target audience is grades 5 through 9.

Requirements for each phase:

a. Update artwork and graphics being mindful to include representation of diverse populations, as well as places (urban, suburban, rural) that illustrate Pennsylvania's unique geographic areas, topography and landforms. All illustrations must represent Pennsylvania.
b. Incorporate Keep Pennsylvania Beautiful's litter research data where appropriate,
c. Incorporate the Litter Hawk logo, graphic and messaging in all materials,

d. Align with the most current, approved, PA Department of Education academic standards, including individual disciplines and integrated standard sets (e.g. the science disciplines, environmental & ecology, technology & engineering, mathematics, social studies, geography, economics, English/language arts, etc.) Also align to appropriate national standards/guidance documents such as the Next Generation Science Standards, North American Environmental Education Association – Environmental Literacy, National Council for Social Studies - *National Curriculum Standards for Social Studies and C3 Framework, etc.*,
e. Create virtual content including animation and/or interactive apps to complement and enhance the new educational tools created,
f. Translate Open Your Eyes to Litter, accompanying teacher guides and virtual content to Spanish.

The awardee is expected to produce final, printer ready, materials, as well as supplemental virtual content, that can be scaffolded from year to year but also used alone (similar to a Project WET and Project Learning Tree) in a format that is useful to teachers/educators and students.

TIMELINE

Proposal Issued: December 3, 2021
Proposal Submission Deadline: February 15, 2022
Contract Awarded: March 1, 2022
Executed Agreement: March 15, 2022
Progress Reports and Drafts: Monthly
Final Format Due: March 31, 2023

PROPOSAL REQUIREMENTS

Please include the following in your proposal:

1. **Project Approach.** Please describe your approach to this project and achieving the desired outcomes. What is your understanding of the needs outlined in this RFP? How would you approach this project?
2. **Prior experience.** Preference will be given to those with an education background, familiarity with the Pennsylvania Department of Education Chapter 4 academic standards, applicable national standards/guidelines, familiarity with the Meaningful Watershed Educational Experiences (MWEE) framework and experience in executing similar projects.
3. **Work Plan.** Please outline specific steps and a timeline for this project. The work plan should include activities and tools necessary to accomplish the goals identified in the scope of work above, and take into account the process requirements identified above.
4. **Qualifications.** Please provide a description of your specific skills related to this project, including similar projects undertaken. In addition, please include a brief biography for yourself and any individual people who might work on the project if you are awarded the contract.
5. **Budget.** Please provide a detailed project-based budget, including stipend and materials.

ORGANIZATION BACKGROUND

At Keep Pennsylvania Beautiful, we envision a clean and beautiful Pennsylvania. Our mission is empowering Pennsylvanians to keep our communities clean and beautiful. Our core values include:

- Improving communities, their environment and quality of life is a shared responsibility.
- Partnering with public and private sector organizations and individuals are essential to achieve sustainable community improvement.
- Engaging and activating people in our community improvement efforts fosters community stewardship.
- Access to both services and resources, as well as education, are both essential to encouraging positive behaviors toward community improvement.
- Diversity is a resource and the diversity of our affiliate network and volunteers is a fundamental strength.

Key initiatives include increasing community capacity around community improvement, **influencing positive behavior through education**, strengthening environmental law enforcement and improving both policy and infrastructure, specifically related but not limited to, waste and recycling in Pennsylvania.

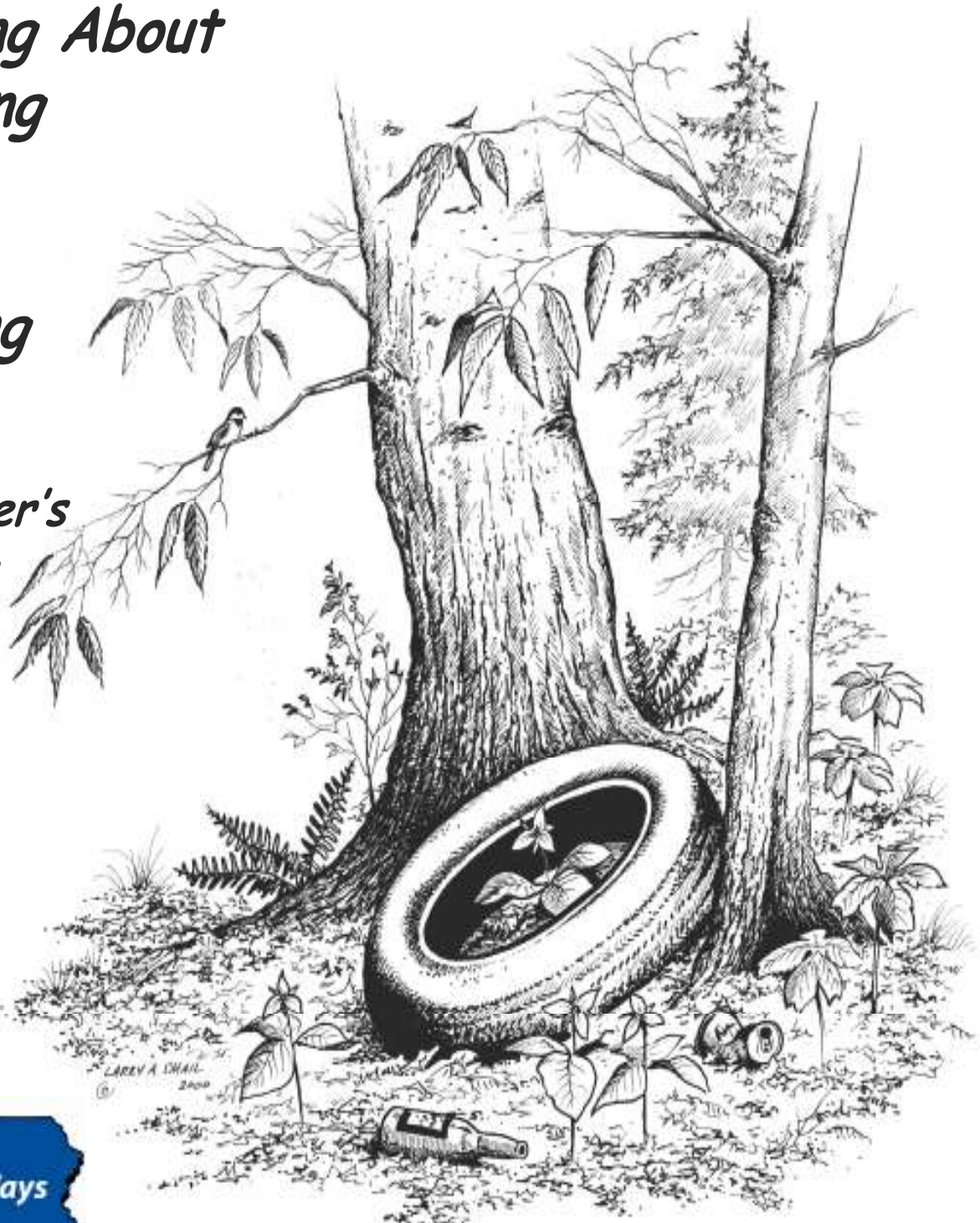
Keep Pennsylvania Beautiful believes that educating our youth is the key to creating a cleaner and more beautiful tomorrow. We know that littering is a behavior and behaviors can be changed. Engaging youth in protecting the environment creates a direct impact on changing behaviors and attitudes and possibly influences their friends and families. Keep Pennsylvania Beautiful's educational materials encourage students to take an active role in protecting and improving our environment through recycling, litter awareness, and community stewardship.

Proposals should be emailed to Stephanie Larson, Program Coordinator, Keep Pennsylvania Beautiful, slarson@keeppabeautiful.org by February 15, 2022.

Project Trash

Learning About Littering and Illegal Dumping

A Teacher's Resource



PA CleanWays

Keeping Pennsylvania Beautiful

5/10 Revision

Project Trash

Learning About Littering and Illegal Dumping

Designed to reach grades 5-9

Created by

Becky Izzo
for

PA CleanWays

With a grant from the Pennsylvania
Department of Environmental Protection
Environmental Education Grants Program

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Table of Contents

Littering/Illegal Dumping—
Teacher Notes

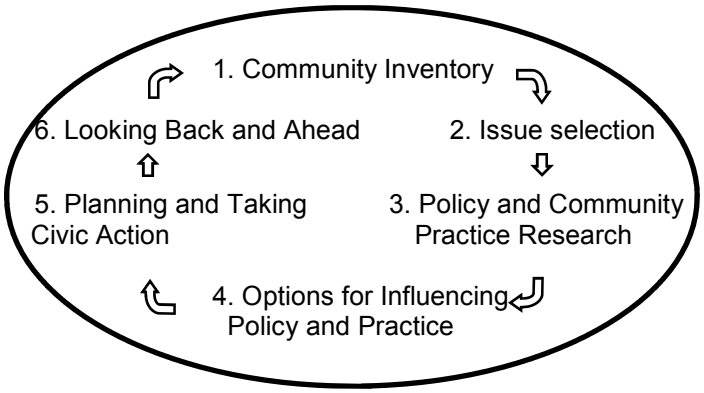
7/07 revision

Purpose of This Learning Resource

This learning resource was originally developed as a supplement to the Earth Force Community Action and Problem Solving (CAPS) Program to assist any school group in addressing littering and illegal dumping in their communities. Earth Force is a nonprofit environmental organization that provides educators with innovative tools to engage young people in community problem solving. Their CAPS program enhances the skills young people need to effectively engage in environmental problem solving and in civic life. (See Resources, p. 53)

Since littering and illegal dumping are one of the possible environmental issues that kids may want to change in their communities, PA CleanWays, the only statewide nonprofit organization whose goal is to fight littering and illegal dumping through community involvement and education, created this learning resource. It was prepared in cooperation with the Pennsylvania Department of Environmental Education Grants Program and in cooperation with Earth Force. (See Resources)

Earth Force has a six step process to implementing change in a community:



This process can be used to select and impact a problem from a wide range of community and environmental issues, or it can be used to select an issue in one specific area, such as solid waste, air pollution, water pollution or loss of animal habitat. This learning module is using the process to select one issue that impacts littering and/or illegal dumping.

Pennsylvania Academic Standards

Project Trash is linked to the following **Pennsylvania** Department of Education Standards for:

- **Environment and Ecology** (grades 4 & 7)
- **Science and Technology** (Grades 4 & 7)
- **Reading, Writing, Speaking and Listening** (Grades 5 & 8)

Standards are located at the end of this resource and are listed for each of the 6 steps of this learning process.

Overview of Six-Step Process

Section One: Community Inventory
Focus on Issue of Littering and Illegal Dumping
What is happening in your community?

Section Objective: At the end of this section, students will have generated a list of local littering, illegal dumping or related solid waste issues and community strengths.

In this section, students will define which community they want to inventory. It could be the larger community in which they live, one neighborhood or section, or the school community. They will also generate a list of community strengths and environmental issues affecting the community, with a focus on littering and illegal dumping. This section helps students sharpen their observation, data gathering, questioning and communication skills. The steps in the community environmental inventory section emphasize student discovery. Students set out to discover the way things really are regarding the community's boundaries, strengths, natural habitats, demographics, environmental issues, and environmental resources. Students may engage in such activities as a newspaper search, a neighborhood walking tour, interviews with local solid waste officials, or a public opinion survey.

Section Two: Issue Selection
What littering or illegal dumping issue do you want to work on?

Section Objective: At the end of this section, students will have selected one littering, illegal dumping or related solid waste issue in their community, upon which to address change or which they want to improve.

In this section, students apply criteria to narrow their list of issues to one, which will be the focus of their activities. The criteria include scale of the issue, students' ability to have an impact, your ability to connect the issue to the curriculum, student interest, and importance to the community. This section hones such student skills as prioritizing, taking and defending positions, making decisions, and collaborating. Students also begin to focus on identifying causes and effects of environmental issues.

Section Three: Policy and Community Practice Research
What are people already doing about this issue?

Section Objective: At the end of this section, students will have identified and assessed the policies and community practices affecting their issue.

In this section, students identify public or private policies and community practices relevant to their issue. Much of this section relies on student discovery. They research who creates policies and practices, whether these help solve or contribute to the problem, and what alternatives have been considered. Such research may enhance students' knowledge of their communities, adding depth to their findings from the community environmental inventory. The research process helps develop students' skills in analyzing data, gathering and using information, assessing the reliability of information, and making judgments. This section focuses on the specific skills needed to conduct fruitful research and to assess the consequences of policies and practices.

Section Four: Options for Influencing Policy and Practice
What are your choices for making a difference with this issue?

Section Objective: At the end of this section, students will have selected a course of action to address their issue.

In this section, students will determine what improved policies and practices would look like, and they will consider various strategies to bring about this vision. Students deal with two questions in Section Four: What policy or practice alternative do we propose, and how will we try to achieve change? Once students identify a policy or practice goal, they apply criteria—such as their time, skill level, and resources—to decide upon strategies for action. Selecting strategies for action enhances students' skills in planning, predicting consequences, matching resources to needs, and taking and defending positions. The section emphasizes democratic decision making and dealing with compromise and setbacks.

Section Five: Planning and Taking Civic Action
What are your plans for making a change?

Section Objective: At the end of this section, students will have planned, implemented, and evaluated their chosen course of action.

In this section, students develop and carry out a detailed plan. Parts of the plan include a statement of the issue, policy or practice goals, strategies to reach the goals, tasks necessary to implement the plan, individual task assignments and timelines, and a budget. Most importantly, Section Five is where the students take definitive action to create change. Students may decide to educate others through a public meeting or creation of a brochure. They may institute a recycling program in their school or expand the recycling opportunities in their community. This section relies heavily on student skills in predicting consequences, collaborating, and working in teams. Students may also rehearse parts of their plan, such as any testimony or public presentations they may give.

Section Six: Looking Back and Ahead
How did everything go? What will you do next?

Section Objective: At the end of this section, students will have assessed what they have learned, celebrated what they have accomplished, and considered what still needs to be done.

In this section, students take stock of the impact of their work, focusing on what civic actions they should undertake in the future. They hone assessment skills as they examine the strengths and weaknesses of the process they used in Project Trash. Students consider questions such as:

- To what extent did we improve policies or practices, and why?
- What civic and environmental information have we learned?
- What advice would we give other students embarking on Project Trash?
- What civic and workplace skills have we gained?

To look ahead, students work as a group to bring closure to their current efforts. If they succeeded in affecting policy or practice change, they would anticipate potential challenges and explain how they would respond. In addition, they would consider how their changes could be monitored and maintained. If they failed to create change, students would generate a list of alternative strategies to reach their goals.

As part of looking ahead, students also think about their future civic involvement. Having reflected on their work with Project Trash, students consider what their community should look like in the future and how they will be involved in that vision. In this way, students have the opportunity to apply newly enhanced civic competencies to changing other policies and practices.

How to Use this Resource Independent of Earth Force CAPS Program (Teacher Notes)

Prior to beginning this inventory, it is important for students to think about and discuss three concepts—**community, environmental issue, and community strength**.

Community — Initiate discussion about what communities they are a part of— their school community, their business community, their church community, their municipal community (town, city, township, etc.) and the global community, for example. As a teacher, you may have administrative constraints that necessitate limiting the definition of community. Let students know ahead of time whatever boundaries exist. (Ex. The administration may decide that your group needs to limit community to the school grounds. Your group would then inventory the school property for any littering or illegal dumping issues. Sometimes those issues only exist after a school event or ball game. Looking at the "big picture" of how the school and/or district deals with solid waste issues is also helpful at this point.) Your group would then select which littering or dumping issue they wanted to research and take action on.

Environmental Issue — A discussion about environmental issues can lead to an understanding of how different kinds of pollution can be interconnected and detrimental to a watershed. For example, students may be able to differentiate examples of source and non-point source pollution that may include the following:

Littering—Wind blows trash into waterways; plastic and other trash contaminate fish and animal habitat.

Illegal dumping—Household trash dumped illegally on lands and in waters may contain such hazardous materials as Freon from improperly disposed refrigerators and air conditioners which release chlorofluorocarbons into the air; paint, motor oil, and pesticides which can be toxic to living things; and dirty diapers, which can carry bacteria harmful to animals and humans.

Industrial pollution—Discharges from manufacturing facilities may not be properly treated prior to discharge into streams and waterways, or particulates and other pollutants may be emitted from smokestacks into the air.

Open Burning—Smoke from burn barrels contains carcinogens, cancer-causing particles, and toxic fumes if chemicals or plastics are improperly burned, posing serious health risks and polluting the air.

If maps are used to illustrate the issues students identify, the sources of pollution can also be identified as source or non-point source pollution. All of this can help students understand the **interconnectedness of everything within a watershed area**.

Community Strength — The search for community strengths can lead to partnerships with local experts and community groups who already provide services and education to the community. Invite

This Resource Contains:

- background information on littering and illegal dumping, associated problems and potential solutions;
- youth problem solving project examples;
- an investigative tool and process to assist groups in gathering community information;
- a summary of laws relating to littering and illegal dumping;
- a list of interesting websites about recycling;
- map showing PA CleanWays chapters;
- map showing PA Department of Environmental Protection by region;
- lists of resources for additional information;
- a glossary of vocabulary words.

them into your classroom, challenge them with questions and see if there are ways for you to work together to expand or complement their efforts. This process is vital in helping students understand how local government operates, how public policy is created, and why and how non-profit groups are formed and how they operate.

1a. Read Background Information
The "Background Information" and "Resource" sections in this module (pages 10-67) provide a good overview of littering and illegal dumping problems around the country, as well as organizations doing something about it. Group members should be given copies of this information to read individually. While reading, they should identify the sections that relate to their community, and think about any local littering or illegal dumping problems that exist in areas that they care about or have been recently publicized.

1b. Group Discussion on the Topic
While discussing the reading assignment (#1 above), list local problems that the group is familiar with, as well as any actions or programs that are already working to address some of the problems.

It is important to remember that this exercise is to help everyone focus on a problem and share what they know from living in the community. It is not necessary to identify every problem at this point.

1c. Complete the Community Investigation: Some members of your group may want to divide up the questions on this investigation tool (pg. 58) and probe further into what is happening in their community. Spend some time practicing telephone etiquette, interviewing techniques, letter writing skills and note taking procedures. These are valuable cross-curriculum skills that are vital for being a responsible citizen.

In addition, the following activities can enhance the community investigation:

Maps: By studying various maps, students can get an overview of their community. Encourage them to identify the community's natural environmental strengths, such as streams, parks and wetlands, as well as potential problem areas. This can be a great starting point for the inventory.

Guided Walking Tour: A walking tour enables students to gain firsthand information. The tour could be through the whole community or just some part of it. Small groups could walk through different areas. Information could be recorded on a map or in a notebook. CAUTION: A student should not conduct a walking tour alone. Consult your school policy for guidance on adult supervision.

How to Gain Support For an In Depth Study At Your School

1. Review the enclosed PA Educational Standards to share the comprehensive nature of this project with others at your school.
2. Take advantage of the cross curriculum approach to learning. This process lends itself to service learning.
3. Work with other teachers, such as an English, writing, science, computer/technology or environmental ed teachers to maximize student's learning. (Research littering and/or illegal dumping for the computer class; read, write about, use public speaking and interviewing skills, and research littering/illegal dumping for the English teacher)
4. In some schools, these projects are so popular that students come back to be part of them even after they've moved on to a new grade. Try to find a way to encourage this.

Media Search: Media searches can take a variety of forms. One possibility is to save different newspapers for several weeks. Students can look through the newspapers making a list of all environmental issues to see if any of the issues impact littering and illegal dumping (waste disposal contracts, costs, recycling opportunities, landfill capacity…) and summarizing what the issues are, how they impact waste disposal and what the community is doing about them.

Surveys and Opinion Polls: Students could develop a survey related to the littering/illegal dumping issue. The survey audience could be the general public, parents, other students, people in one neighborhood, or even environmental experts. Be sure the surveys attempt to discover the diverse views within the community.

Interviews: To get more in-depth knowledge about issues and strengths, students might conduct interviews. The interview would generally be conducted with experts or with persons directly involved with an issue or its solution. Students might want to practice interviewing before conducting their first real interview. Asking good questions and taking good notes are important interview skills that students need to develop.

Phone Book Searches: Using telephone books is a quick and easy way to record basic data about the community. By looking at the government blue pages, for example, students can begin to understand which local government agencies are concerned with the environment in their communities. The yellow pages could be a good source of information about organizations and businesses that focus on the environment.

Internet Search: The amount and quality of *local* information that students can research on the Internet depends on your community. Some communities and the organizations within them have websites that deal with environmental issues, recycling/waste collection, and list nonprofit organizations that focus on specific environmental issues. Many environmental organizations, including PA CleanWays and Earth Force have websites that can help students link to local chapters or resources in the community. Government resources might also be tapped through the Internet; many agencies have websites and many respond using e-mail.

Library Research: The library is one place to conduct a media search. It may also be a place to view maps, use the Internet, or look through yellow and blue pages. In addition, the library may have photographs of the community, both past and present, as well as many other materials that would assist in conducting an inventory.

Recording the Results: After students have carried out their activities, they need to share the information they have gathered. Two lists should emerge: a list of littering/illegal

Developing an Action Plan and Solving the Problem

This learning module was developed as a supplement to the Earth Force CAPS Program educator guide; however, it can be used by any educator to give background information on littering and illegal dumping, and to help guide an investigation of possible problems in the community.

The identification of solid waste problems through a community investigation is only the first step in any comprehensive problem solving strategy (such as the Earth Force CAPS program).

You may use this module to develop strategies that contain the following steps needed in order to proceed with the rest of the problem-solving process. They include segments on:

- researching policy and community practice;
- options for influencing policy and community practice;
- developing an action plan;
- taking action; and
- reflecting back and looking ahead.

dumping issues and a list of community strengths. Students may want to record them on chart paper or a wall chart. They could also be recorded on the community map.

1d. Community Strengths
While group members are investigating problems, they will also discover positive things taking place that should be recorded. Keep track of programs, success stories and actions being taken by individuals, organizations, government, or businesses to help prevent or clean up litter and illegal dumps, as well as efforts to educate people on this problem. Keep track of people (concerned individuals, environmental experts and supportive people in government and organizations), places (beautiful parks, clean waterways, and healthy wetlands), and things (a bike path, non-profit organizations, successful recycling or cleanup programs). These strengths can first be recorded on large wall charts, and then transferred to scrapbooks, charts, maps, lists, etc., for a more permanent record.

2. Problem Selection
Once the survey is completed and a comprehensive list of problems relating to littering and illegal dumping is developed, the group needs to choose one or more specific components that they want to work on as a project.

3. Policy and Community Practice Research
At this point, students identify public or private policies and community practices relevant to their issue. They research who creates policies and practices, whether these help solve or contribute to the problem, and what alternatives have been considered.

4a. Options for Influencing Policy and Practice
Once policies and practices have been examined and decisions made about which ones they would like to change, students are ready to determine HOW they would like to influence the policy or practice. Defining a course of action is where the students say "Instead of this, we want that." "Instead of the current policy, we would like this new policy, and here is how we will try to put the policy into place." "Instead of what people are doing now, we would like to see them acting in this other way, and here is how we will try to influence them to do so."

Much discussion will go into options and how they will influence the policy or practice goal they want to achieve. Having done a thorough job of steps 5, 6, and 7 will help students to reach thoughtful decisions based on sound logic, facts and knowledge of this issue's history. Remember this is not a quick fix or a community service project. The goal is to have the environmental issue be better or improved a year from now. The real life examples of students who implemented change in Examples of Youth Actions to Help Fight Littering and Illegal Dumping can help guide this process.

CONSIDER...

What can we do so that the problem will be improved a year from now?

"Instead of this, we want this."

"Instead of the current policy, we would like this new policy, and here is how we will try to put the policy in place."

"Instead of what people are doing now, we would like to see them acting in this other way, and here is how we will try to influence them to do so."

GOAL

To put into action a change in policy or in people's behavior so that the environmental issue chosen is improved and will be better a year from now.

4b. Resources and Sample Service Learning Projects
This section (pg. 50-57 and 61-66) contains helpful "starting point" information for students as well as teachers. These organizations, websites and service learning projects provide valuable links to people, places and ideas with whom you and your students can connect to, share ideas, and learn.

5. Planning and Taking Civic Action
At this point, students develop and carry out a detailed plan to create long term change around their chosen issue. They should be clear about their goals, have a detailed plan, individual task assignments, and timelines and a budget.

6. Looking Back and Ahead
This component will give students the assessment skills needed to evaluate the strengths and weaknesses of the process they used in Project Trash. Looking at their project and processes objectively will enable students to know what worked, in addition to what they would do differently next time. This step is one of the most valuable in helping students to become knowledgeable, active citizens.

This Resource Contains:

- background information on littering and illegal dumping, associated problems and potential solutions;
- youth problem solving project examples;
- an investigative tool and process to assist groups in gathering community information;
- a summary of laws relating to littering and illegal dumping;
- lists of resources for additional information;
- a glossary of vocabulary words.

How to Use this Resource with Earth Force CAPS Program (Teacher Notes)

1. Review Segment One of the CAPS Educator's Guide
The Community Environmental Inventory process outlined in "Segment One" of the CAPS Program in the Student Guidebook and the Adult Manual provides important background information and details on how to proceed, whether undertaking the comprehensive community inventory (outlined in Segment One of the manuals), or the focused inventory provided in this resource.

2. Read Background Information
The "Background Information" section in this resource (pages 10-67) provides a good overview of littering and illegal dumping problems around the country and through the ages. Group members should be given copies of this information and Resources to read individually. While reading, they should identify the sections that relate to their community, and think about any local littering or illegal dumping problems that exist in areas that they care about or have been recently publicized.

3. Group Discussion on the Topic
While discussing the reading assignment (#2 above), list local problems that the group is familiar with, as well as any actions or programs that are already working to address some of the problems.

It is important to remember that this exercise is to help every-

one focus on a problem and share what they know from living in the community. It is not necessary to identify every problem at this point.

4. Conduct the Community Investigation
The "Investigation" included in this resource (pg. 58) is one tool to help students gather information on many aspects of the problem. "Segment One" of the CAPS Program educator guide lists additional methods which students can use to collect community facts, ideas and points of view.

5. Community Strengths
While group members are investigating problems, they will also discover positive things taking place that should be recorded. Keep track of programs, success stories and actions being taken by individuals, organizations, government, or businesses to help prevent or clean up litter and illegal dumps, as well as efforts to educate people on this problem.

6. Problem Selection
Once the survey is completed and a comprehensive list of problems relating to littering and illegal dumping is developed, the group needs to choose one or more specific components that they want to work on as a project.

"Segment Two" of both the Adult Manual and the Student Guidebook details a process that group members can use to help narrow down the list of problems in order to choose a manageable project.

7. Resources and Sample Service Learning Projects
This section contains helpful "starting point" information for students as well as teachers. These organizations, websites, and service learning projects provide valuable links to people, places and ideas with whom you and your students can connect, share ideas, and learn.

Background Information on Littering and Illegal Dumping

In order to understand and appreciate the problem of littering and illegal dumping in our communities, it is helpful to know some of the background about how people have dealt with their solid waste throughout the ages. The history of how people have collected and disposed of their waste over the last several hundred years is very interesting and offers great variety. Although much has changed over the years, one of the most lasting truths about the waste issue is that much has stayed the same. Until the effects of trash become a problem or hardship, "out of sight, out of mind" is a comfortable way for people to think about it.

Early Civilizations

The early Roman civilization had developed a fairly complex sewage and water supply system; however, their garbage was usually dumped into the Tiber River or into large pits on the cities' outskirts. The Romans knew that garbage attracted rats and rats could spread disease, so in order to prevent sickness that could wipe out great numbers of their people, they kept their wastes outside of the city walls. The Greeks were greatly influenced by the Romans and their culture reflected the same patterns of waste disposal.

Middle Ages

Waste management took a turn for the worse following the fall of the Roman Empire. In the 15th and 16th centuries, English castles had "privies," (small rooms featuring a wooden or stone seat placed over a vertical shaft that led to a moat, barrel or pit.) The moats which surrounded castles were filled with the various wastes produced by the people living in them. They collected rain water and became a breeding ground for disease. These filthy moats also became effective barriers that kept the enemies of the castle at a distance. Poorer people, who didn't have castles, simply threw their wastes into the gutters of the street.

Industrial Revolution

In England and much of Europe during the Industrial Revolution, many people moved to the cities and into crowded and unsanitary living conditions. In order to be polite, people tossing waste water and the contents of their chamber pots out windows onto the street below were supposed to shout "Gardez L'eau" (literally "watch out for the water"). This saying remains a part of British vocabulary today in the use of the word "loo", slang for toilet. Things got so bad in England that in 1848, a Public Health Act was passed mandating some kind

Did You Know?

- About 12 million scrap tires are generated each year in PA. That's about 1 per person. Approximately 19 million scrap tires remain in large stockpiles scattered throughout the state. 17 million tires have been cleaned up within the past four years.
- There are 54 permitted landfills accepting municipal solid waste in PA and six waste-to-energy facilities where trash is incinerated for the production of energy.
- Paper can potentially be recycled up to seven times before the fibers begin to deteriorate and most recycled paper can be substituted for non-recycled paper.

Source: PA Department of Environmental Protection, 2000

of arrangement for every house, whether it be a flush toilet, a privy or an ash pit. The Act did little to solve the problem, for soon after the streets were cleaned up, the rivers started to reek. The Thames River quickly gained a reputation as a "cesspool," and in the hot summer of 1859, the smell from the river was so pungent that Parliament had to be suspended. Disease, cholera in particular, was a problem.

Native Populations

Early man and many native populations spent much of their time on the basic necessities of life. Providing food for their families by hunting, gathering or gardening, building adequate shelter, and making clothing were activities that consumed huge amounts of their lives. Life was based around survival, and there were few extras. When an animal was killed, every part was put to good use and nothing was wasted. The meat was smoked and stored to provide food throughout the year. After the hides were dried and stretched, they were used to make clothing, bedding, shelter, and cooking implements. The bones, sinew, some internal organs and antlers were all used to create needed supplies for their survival. Any unused parts were returned to nature for other animals to eat. Nothing was wasted.

Generally, many of these native societies around the world had a great respect for the land, water and animals on which they depended. Never taking more than was needed, finding ways to completely utilize what was taken, and then giving back to nature by practicing waste minimization was a way of life for them.

Colonial America

Most early settlers from Europe or the Colonies who ventured into unknown territories could take only a limited amount with them - whatever they could carry with them on a ship, pack on a horse, or load into a wagon. When things wore out, they were repaired, patched, or rebuilt. The old adage "Make do, or do without" was probably heard often in these early days. The settlers had few "extras". When wagons broke down and couldn't be repaired or horses died and the wagons lost their means of power, the settlers piled whatever furniture, clothing and supplies that couldn't be carried on their backs or packed onto their remaining horses by the side of the trail. Others following behind could then pick up the discards if they were able to transport them.

According to the U.S. Environmental Protection Agency, **each American generates 4.3 pounds of trash each day**, for a total of 200 millions annually nationwide. Less than 1/4 of it is recycled.

Source: MSNBC.com, December, 2000

Stories of the old West describe trails lined with stoves, anvils, furniture, spoiling food, the remains of butchered animals, and human waste. One account promises that newcomers would be able to *smell* their way to the Rockies in 1849 and 1850!

Early settlers, like the Native Americans already here, used rivers, woods and shrubs to fulfill their toilet needs and threw their garbage into dumps, usually over a bank not too far from their homes. Through the investigation of these early dumps, we have learned that only what truly couldn't be used was thrown out. Broken dishes and bottles, worn out leather items, clam shells (if the dump was near the ocean), and unusable metal items have all been found there. In many places, food waste and/or fish was buried in garden plots to enrich the soil. This early form of composting was taught to the settlers by the Indians.

During colonial times, in towns and later in cities, people emptied their pots and garbage out their doors and windows, just as they had in England. Streets in these areas often had running streams of garbage, waste and mud. As early as 1700, ordinances were passed to prevent people from throwing waste in the street.

1800's

Never before in history did the middle class have the ability to purchase items that were now made in mass quantities in factories. Previously, prized possessions and house wares were handcrafted. Now, people could buy what they wanted from their general store or through mail order catalogs, like Sears and Roebuck and Montgomery Ward.

Refuse disposal until the mid-19th century can be described as citizens throwing waste out of doors or into waterways. As people moved to towns and cities, dumps were required to be outside the city gates. Until the garbage piled up outside the city gates became a problem, either because it hindered access to and from the city, and caused a severe smell or spread highly contagious diseases, not much was done about it. In 1874, English concerns for the unsanitary handling of wastes prompted the invention of a process for incinerating or burning of municipal waste called the "The Destructor". By 1885, the first municipal solid waste incinerator was in use on Governor's Island in New York. By 1914, over 300 such incinerators were in use throughout the U.S. and Canada.

Ocean Dumping

Ocean dumping had been a common method of waste disposal around the world. Not only household garbage, but hazardous wastes, obsolete ammunition, scrap metal and boats have been disposed of in the oceans. Barges from U.S. coastal cities routinely carried trash out into the open ocean and dumped it. It wasn't until 1988 that the U.S. banned the dumping of industrial and sewage wastes into the ocean.

Sea dumping of wastes has been a common practice in the waters surrounding Australia, from the first European settlement until a couple of decades ago. During

DID YOU KNOW?

- If you heaped up all the trash thrown away in the U.S. each year, it would cover at least 1,000 soccer fields with piles of waste 30 stories high. (1)
- Every day, Americans use 100 million steel cans. (2)
- America's daily use of computer paper could go around the world 40 times. (3)
- American consumers and industry throw away enough aluminum to rebuild our entire commercial air fleet every three months. (Kimball, pg. 3)
- The collection and recycling of paper provides five times as many jobs as the harvesting of virgin timber. (3)

Sources

(1) Skidmore, Steve, 1991. What a Load of Trash! The Milford Press, Inc., Brookfield, CT.

(2) Kimball, Debi. 1992. Recycling in America: A Reference Hand-book. ABC-CLIO, Inc., Santa Barbara, CA.

(3) McHarry, Jan. L994. The Great Recycling Adventure: a lift flap look at old things made new. Turner publishing, Inc., Atlanta, GA.

the 1920's there was considerable public concern about pollution washing up on beaches in the Australian cities of Sydney, Melbourne and Adelaide. Ships routinely discharged loads of garbage just off the coast. Some of this waste included parts of butchered animals, organic refuse, municipal waste and ashes. For the past sixty years, sea dumping has been regulated by legislation with increasing restriction on the type of material dumped. However, some ocean dumping is still permitted by some countries.

Modern Legislation

As cities developed more successful ways of dealing with municipal waste, people became used to putting out their trash, having it picked up at the curb and then not worrying about it. Municipal trucks and local haulers carried the trash to dumps. In the early 1900's each town or city had its own dump, usually over a steep bank on the edge of town, where the trucks were unloaded and machinery compacted the trash.

It wasn't until 1965 that the federal Solid Waste Disposal Act was signed, funding research and grants into the solid waste issue. And in 1970, the first federal guidelines for dealing with solid waste were issued. "Town Dumps" were banned and sanitary landfills were developed to more safely "bury" our waste. April 22 of that year was also our country's first Earth Day, bringing education and awareness to everyone about what they can do to treat our earth responsibly.

In rural areas, farmers were advised by the U.S. Cooperative Extension Service as recently as the 1940's and 50's, to find a ravine on their property where they could dispose of the large amounts of trash that farms produced. In later years they were encouraged to occasionally cover the dump with dirt. Sometimes these farm dumps were set on fire to dispose of the burnable items and reduce the size of the dump. It wasn't until pesticides and farm chemicals deposited in these dumps began to leach into nearby waterways that they were prohibited and alternative methods for disposing of waste encouraged. Some of the money from the "Superfund" created to deal with our country's toxic waste dumps is now making its way into the hands of these farmers to help with the costs of cleaning up their farm dumps. However, in many rural areas, the habit of using a burn barrel to dispose of burnable trash and then pitching the rest over a bank is ingrained and hard to break.

As people became more aware of the negative effects of careless trash disposal, the government passed new laws. The federal government and the states said how waste should be transported, how landfills should be built to protect the environment, and then classified types of waste and disposal methods for specific kinds of waste.

DID YOU KNOW?

Waste Generation Facts

Year	Million Tons
1960	88
1994	214
1997	217
1999	230

Environmentally Sound Strategies for Municipal Solid Waste

1. Source Reduction (including reuse)
2. Recycling and Composting
3. Disposal in Combustion Facilities and Landfills

Currently, Waste In the US is:

- 28 % recovered and recycled or composted
- 15% burned at combustion facilities
- 57% disposed in landfills

What is Recycled?

- 42% of all paper
- 40% of all plastic drink
- bottles
- 55% of all aluminum beer and soft drink cans
- 57% of all steel packaging
- 52% of all major appliances

The per capita discard rate (after recovery for recycling, including composting) was 4.6 pounds per person per day in 1997, up from 3.1 pounds per person per day in 1996.

Source: U.S. EPA, (**www.epa.gov**) 2002

the local unlined municipal dumps serving smaller populations were closed. Suddenly the cost of setting your bags of garbage at the curb for pickup greatly increased.

One of the valuable lessons that first Earth Day in 1970 gave us was information on what we could do to lessen the amount of trash that we put in the waste stream. Reduce, Reuse and Recycle became the chant of those early environmentalists. The federal goals requiring us to recycle increased percentages of our waste (in 2005, 35%), stimulated many states and municipalities to start mandatory recycling programs for some of their citizens. Whatever trash gets diverted from our landfills, the longer the landfills will last. Lots of people regularly separate steel and aluminum cans, glass and plastic bottles and newspapers, and take them to a drop off center or place them at the curb. In some rural areas, newspapers are shredded by farmers who use them for animal bedding.

Holiday Waste

- The Cygnus Group notes that approximately 2.65 billion Christmas cards are sold each year in the U.S.—enough to fill a football field 10 stories high or circle the planet 10 times.
- The annual trash from gift-wrap and shopping bags alone, the group says, totals about 4 million tons.

- If every household reused just two feet of ribbon each year, the resulting 38,000 miles of ribbon could tie a bow around the Earth.
- If everyone wrapped just three gifts in reused paper, enough paper to cover 45,000 football fields would be saved.
- If everyone sent one fewer card, 50,000 cubic yards of paper would be saved.

Source: MSNBC.com, December, 2000

Trash Timeline
and
A History of Waste Management

12,000 B.C.
Egyptians use the first **glass**, in the form of beads.

10,000 B.C.
Garbage becomes an issue as people first begin to establish permanent settlements.

1500 B.C.
The first **jars and bottles** are made out of **glass**.

400 B.C.
Athens, Greece, organizes the **first municipal landfill** in the Western world and requires waste disposal at least one mile from city walls. Virtually anything considered unwanted waste is left in the dump.

105 A.D.
Paper is invented in China by Ts'ai Lun.

200
The **first sanitation force** is created by the Romans. Teams of two men walk along the streets, pick up garbage, and throw it into a wagon.

1000-1400 A.D.

Parisians cast garbage out their windows. Although several attempts are made at effective collection and disposal, eventually the waste grows so high beyond the city gate that it becomes an impediment to Paris' defense. In general, people slowly become aware of waste as a health hazard. Public resistance to new regulations is strong, however, and primitive collection and disposal methods dominate.

About A.D. 1000
People in Turkey recycle marble building facings into cemetery headstones.

1031
The Japanese use wastepaper to make new paper — the first recorded occurrence of **paper recycling**. The Chinese probably employed the process earlier.

1131
Paris prohibits swine (pigs) from running loose in the streets.

American Waste Statistics

Municipal Waste Generated
- 1997 - 340 million tons
- 1999 - 390 million tons

That is nearly a 50 million ton increase in two years!!

Source: Biocycle "*The State of Garbage in America*" JG Press, Emmaus, PA

PA Imports Trash!!

Pennsylvania imports more trash than any other state in the U.S. — almost 8 million tons in 1999.

Source: Biocycle "*The State of Garbage in America*" JG Press, Emmaus, PA

About 1150
The **first European paper** probably is manufactured in Spain. Recycled rags are used as virtually the only source of paper fiber for the next 700 years in the West.

1348
The **Black Death** epidemic reaches Europe from Asia, caused in part by garbage tossed into unpaved streets and vacant spaces which attracted rats. Fleas that traveled on the backs of infected rats quickly spread the disease to humans. Millions of people died.

1388
Reacting to waste disposal methods that involve simply throwing garbage out of windows and doors, the **English Parliament bans waste disposal in public waterways and ditches**.

Laws are developed requiring that garbage be taken outside of the city gates, but 12 years later in Paris, **garbage** has piled up so high outside the gate that it actually **interferes with the defense of the city**.

1400-1750

People generally throw away garbage in random, unorganized ways. Cities pass laws against the most unsanitary practices, but it does little good.

1400
The **waste** from Paris is piled so high outside the city gates that it **interferes with the city's defenses**.

A new regulation in Paris requires anyone who brings a cart of sand, earth, or gravel into the city to leave with a load of mud or refuse.

1551
The **first recorded use of packaging**: German papermaker Andreas Bernhart begins placing his paper in wrappers labeled with his name and address.

1608
Glass was part of the first cargo ever shipped from the American shores, and a **glass factory was established in Jamestown, Virginia.** Not only was it America's first factory, but glass was America's first industry--created a dozen years before the arrival of the Pilgrims in 1620.

1642
Scrap use comes to North America as the **first iron furnace** is built in Saugus, MA.

1646
Jenks Iron Works in Lynn receives permission to buy the Massachusetts colony's guns and melt them down.

1657
Residents of New Amsterdam (New York) are among the first to **pass laws prohibiting the throwing of trash into the streets,** but street conditions remain the homeowners' responsibility.

1690
The Rittenhouse family establishes America's **first paper mill** on the banks of Wissahickon Creek near Philadelphia. It makes paper from recycled cotton and linen as well as used paper.

1750-1870

The Industrial Revolution begins in England. It represents a landmark increase in the amount of waste generated. Waste collection first emerges as a city service, although collection occurs largely by scavenging. In the United States, cities are smaller and space and natural resources are more plentiful. But Americans have the same habit as the English of throwing garbage into the streets. The streets reek of waste. By the mid-19th century, several cities pass ordinances against indiscriminate dumping of refuse and the free roaming of animals, but those measures aren't enough to curb the waste problem. Waste collection and disposal methods remain primitive.

American colonists declare their independence from England and they turn to recycling for materials to support the Revolutionary War effort.

Late 1700's
Ragpickers, men with horse-drawn carts, make trips into rural areas to barter for worn-out farm implements and other items, including rags and bones, that have resale value.

1757
Benjamin Franklin starts the **first street cleaning program** in North America in Philadelphia.

1776
The **first metal recycling** occurs **in America** when patriots in New York City melt down a statue of King George III and make it into 42,088 bullets.

There has always been garbage…..

"...the feast of fat things that come reeking under one's nose at each special puddle of festering filth that Center Street provided in its reeking, fermenting, putrefying, pestilential gutter! I thought I should have died of the stink, rage and headache before I got to 21st Street."

- a journal description of a New York City street, 1852

1785
The **first cardboard box** made **in America** is manufactured in Philadelphia by Frederick Newman.

1792
Benjamin Franklin uses slaves to carry Philadelphia's waste downstream.

1800
Matthias Koops obtains a patent in England for a paper de-inking process. The following year, Koops builds the first commercial mill in the West to use materials other than cotton and linen rags to make paper.

1810
The **tin can** is patented in London by Peter Durand.

1834
Charleston, WV, enacts a **law protecting garbage-eating vultures** from hunters.

1840's
Peddlers in America, primarily immigrants, **begin collecting and recycling** anything with resale value.

1850's
Pioneers heading west abandon personal belongings along the way and junk dealers scavenge the materials along the trails.

1858
The **Mason jar** is invented, allowing fruits and vegetables to be preserved.

1860
More than 500 paper mills are operating in the U.S., using cloth rags as their primary source of fiber.

Private scavenging companies and municipal crews begin working together to clean up New York. They **remove 15,000 horse carcasses from the city streets** (city horses have rough lives pulling street cars; their average life expectancy is only two years!)

1861-1865
During the Civil War, both the North and South urge citizens to donate all old metal objects. In the South, this need is critical due to the North's control of iron making.

1865
Newspapers begin to describe the availability and price of scrap.

RECYCLING FACTS

- Recycling reduces the risks of air and water pollution from manufacturing processes. Recycling paper cuts air pollution by about 75%. Substituting steel scrap for virgin ore reduces air emissions by 85% and water pollution by 76%.
- Every ton of recycled steel saves 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone.
- Every pound of steel recycled save 5,450 BTU's of energy, enough to light a 60-watt bulb for over 26 hours.
- Recycling a ton of glass saves the equivalent of nine gallons of fuel oil.
- Recycling used aluminum cans requires only about 5% of the energy needed to produce aluminum from bauxite. Recycling just 1 can saves enough electricity to light a 100-watt bulb for 3 1/2 hours.
- A ton of paper made from 100 percent recycled paper saves the equivalent of 4100 KWH energy, 7000 gallons of water, 60 pounds of air emissions, and 3 cubic yards of landfill space.

Source: PA Department of Environmental Protection Agency, 2000.

An **estimated 10,000 hogs roam the streets of New York City**, gorging on garbage.

1866
New York City's Metropolitan Board of Health declares war on trash, forbidding the throwing of dead animals, garbage or ashes into the streets.

1868
Chemist John Hyatt saves thousands of elephants, which were killed for their ivory tusks, by inventing celluloid for billiard balls. The balls sometimes spark on collision and even explode, requiring a search for improvements that lead to **the invention of plastics**, an industry that Hyatt can be said to have founded.

1870-1902

The industrial city emerges in America, characterized by mounds of putrefying garbage. It lands in the streets and waterways. People dump garbage, slag, ashes and scrap metal on vacant land. Industries dump animal waste in open pits or empty lots. The proliferation of horses leads to an excess of manure and carcasses. By the 1890's the U.S. recognizes "**the garbage problem**." It is considered a health issue, not just a nuisance. Cities debate contracting with private companies or establishing a municipal service.

1874
Concerns about unhealthy sanitary conditions in England prompt a new invention in Nottingham—**"The Destructor" provides the first systematic incineration of municipal solid waste** (MSW). **Curbside recycling begins** for the first time in the United States **in Baltimore**.

Late 1800's
A revolution in the steel making industry takes place as the open hearth furnace gradually replaces the Bessemer process. The advent of the open hearth and later the electric furnace results in a **dramatic rise in demand for scrap**.

1885
The **first garbage incinerator in the U.S. is built on Governor's Island, New York**. By 1914, 300 incinerators are located in the U.S. and Canada.

1887
The **American Public Health Association appoints a Committee on Garbage Disposal**, to determine the extent of the refuse problem in the U.S. The committee spends ten years on its assignment.

PA RECYCLING FACTS

- Curbside and drop-off recycling has become a way of life for 10 million Pennsylvanians.
- In 1999, we achieved a recycling rate of 32.6%, well on our way to our goal of 35% by 2003.
- In PA, 3,247 recycling and reuse businesses employ 81,322, with an annual payroll of $2.9 billion.
- More than 10 million residents, or at least 85% of the state's population, have access to recycling.
- Twelve of the 67 counties exceeded the state's 35% recycling goal in 1999. These counties were responsible for 57% of the state's recycling.

Source: PA Department of Environmental Protection, 2002

1880's-1890's
Garbage often is dumped near "least desirable" neighborhoods. Protests from residents there are largely ignored.

1888-1913
A survey shows selected American cities generate 860 pounds of garbage per capita, compared with 450 pounds for English cities and 319 for German cities.

1890
The **Boston Health Department proclaims burning waste to be the "best and safest" means of disposal**. But because of the high cost of commercial incinerators, the department recommends burning waste in home kitchens.

1890's
Sanitary engineers become more prominent in addressing waste management, **applying a more organized, scientific approach**. Civic organizations increasingly try to raise public consciousness about the refuse problem.

1895
Col. George E. Waring Jr. is appointed New York City street cleaning commissioner of New York City. He develops the first practical, comprehensive system of refuse management in the U.S. Among his other reforms and innovations, he is the first to attempt to separate refuse on a large scale, to allow the city to recover and resell some of the materials and allow street crews to handle them more easily. His plan requires everyone to keep organic waste, rubbish and ashes in separate containers and begins the city's first municipal recycling program. In 1898 he takes over from "scow trimmers," who rummage through dumping scows (headed for the ocean) for materials with resale value, and establishes the first rubbish-sorting plant in the U.S. The city's recycling operation was closed in 1925 due to complaints about odors, and ocean dumping gradually resumed until it was outlawed again in the 1980's.

1895
King C. Gillette, a traveling salesman, tires of sharpening his razor and creates the **disposable razor blade**.

1896
The Vienna or Merz system of **extracting oils and other by-products through the compression of city garbage** is introduced in Buffalo, NY. The reduction process gives cities a disposal method that provides recoverable and resalable materials from waste.

1902-1924

1902
Municipal solid waste collection, i.e. **curbside pickup, becomes the norm in cities**— 79% of the U.S. cities surveyed by the Massachusetts Institute of Technology provide it. Trash is taken to the "town dump."

1903
Corrugated paperboard containers find use commercially.

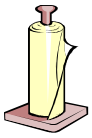
1904
The nation's first major **aluminum recycling plants** open in Chicago and Cleveland.

The U.S. allows permit mail, which opens the door for **direct mail advertising**.

The following year, the **Williamsburg Lighting Plant** is constructed on Manhattan's Lower East Side and **incorporates waste recycling and incineration**.

And lastly, at the World's Fair in St. Louis, a gold medal is awarded for the first successful scrap handling magnet. Within two years, **magnets are used throughout the scrap industry**.

1905
The publication Engineering News notes that experiments involving the plowing of waste into the land in and around St. Louis might offer opportunities for the systematic **burying of garbage**.



1907
The **first paper towels** are developed.

1908
Paper cups replace tin around the U.S. in vending machines, in public buildings and on trains. **America also becomes the leading producer of paper and paper products** (about 640,000 tons) **and the leading consumer** (38.6 pounds per capita). To meet increasing demand and the fear of deforestation, the U.S. steps up imports of rags and wastepaper. By 1916 the U.S. produces 15,000 tons of paper per day, using about 5,000 tons of old paper.

Manufacturers develop means to remove printer's ink from old newspapers through a defibering process, while other processes turn old paper into cardboard and pasteboard.

1909
Kraft paper pulp is first made in the U.S.

PA RECYCLES!!

- **PA Act 101** of 1988 requires commercial, institutional and municipal establishments located in Pennsylvania's mandated municipalities to **recycle high-grade office paper, corrugated paper, aluminum, and leaf waste**. In addition, establishments must recycle any other materials included in the municipality's recycling ordinance.
- PA Act 101 encourages municipalities to establish leaf composting programs and provides recycling grants to help offset costs. More than 80 municipal leaf composting facilities are in operation in PA.
- In 1995, volunteers directed a recycling program at Penn State University's Beaver Stadium, and after six home games they recycled 28 tons of paper and other materials, reducing the total waste by 32%.
- 58% of Pennsylvania's 67 counties are working in partnership with Penn State Extension county offices to offer backyard composting bins to residents.

Source: PA Department of Environmental Protection, 2002

1910
A gas cutting torch is first used in a scrap yard in Lebanon, PA.

1912
Cellophane (clear plastic) is invented by Swiss chemist Dr. Jacques Brandenberger, which encourages the use of plastic packaging.

1914
Source reduction of waste is on the wane because people consider it too costly and it affects too little of the waste stream. Incineration also struggles in the U.S. because of problems adapting the English model.

1916
Cities begin **switching from horse-drawn to motorized refuse collection equipment**.

A shortage of rags and wastepaper caused by WW I prompts the U.S. Department of Commerce to encourage citizens to save those materials for mills.

Dr. Thomas Jasperson obtains a U.S. Patent for the production of paper from de-inking recovered fiber around the same time.

1917
Experimentation takes place with turning waste into energy, such as steam, electricity, liquid or solid fuels, alcohol or fuel bricks. The methods have little impact because existing energy sources are cheap. Also, in response to wartime shortages, the **U.S. Government establishes the Waste Reclamation Service**, which stresses the value of waste.

1920's
Population growth begins spreading out; society becomes more **consumer and service-oriented**, and **generates** significantly **more waste**. The U.S. Government becomes more deeply involved in the affairs of the city. Filling in wetlands with garbage, ash and dirt becomes popular.

1924
Farm use (fertilizers, animal feed) is **the most popular form of waste disposal** at 38 percent in a survey of U.S. cities, followed by incineration at 29 percent and dumping at 17 percent.

Municipal collection of waste rises to 63 percent of cities in the U.S. Census, compared with 24 percent in 1880.

In addition, the **Kleenex facial tissue** is introduced.

You and Your School Can Make A Big Difference!!

EPA's WASTEWISE PROGRAM

Alden Central School

Alden Central School, a K-12 school in Alden, NY, implemented a comprehensive waste reduction program at all campus buildings: high school, middle, intermediate and primary education buildings and the grounds department. Students and 250 staff members:

- Eliminated 400 pounds of polystyrene cafeteria trays and dishes by switching to reusable products
- Composted 850 pounds of cafeteria waste and 100 pounds of yard trimmings for use as mulch on building grounds.

WasteWise Accomplishments

- Waste Prevented 2,450 lb.
- Recycling Collection 2,900 lb.
- Recycled-Content Purchases 2,250 lb.

1930-1950

1930's
Enclosed collection vehicles begin replacing horse-drawn waste carts.

1934
Dumping of municipal waste at sea becomes illegal. Industrial and some commercial wastes are immune from the law.

1935
The **first beer can** is produced by Krueger's Cream Ale in Richmond, VA. Over the next six months, company sales increased 550% because customers loved the convenience.

The **first sanitary landfill is built in Fresno, CA**. Closed in 1987, the landfill is now on the Superfund list of the nation's most polluted sites.

1939-45
Wartime shortages **increase the demand for reusing tin, rubber, aluminum, paper, fats and other materials to help the war effort.**

1943
The **aerosol can** is invented by two researchers at the U.S. Department of Agriculture.

1944
Dow Chemical Company invents **Styrofoam**.

1946
Sanitary landfills become a preferred disposal alternative to open dumping.

Late 1940's
The popularity of **electric arc furnaces** for steel production increases. These furnaces produce fewer emissions and much less pollution.

1948
Fresh Kills landfill is opened in Staten Island, NY. It later becomes the world's largest city dump. Fresh Kills and the Great Wall of China are the only man-made objects visible with the naked eye from space.

It takes 36 two-liter bottles to produce one square yard of carpet.

(Source: www.erie.oh.us/)

One pound of newspaper can be recycled to make six cereal boxes, six egg cartons or 2,000 sheets of writing paper.

(Source: www.erie.oh.us/)

Among the 20 Most Industrially Advanced Nations

The U.S.:

- Ranks only 15th in paper recycling efforts
- 19th in glass recycling
- 96% of U.S. plastic and 50% of its paper goes into landfills
- Mexico recycles more glass than the U.S.

E/The Environmental Magazine March April 97

1950-1970

1950's
In-house garbage disposal units become popular. In some cities, it's estimated that 25-30 percent of all garbage is ground up.

1953
The anti-litter association **Keep America Beautiful** forms.

Also, Swanson's introduces the first successful **TV dinner**. **Convenience food** of all kinds increase rapidly in popularity during the 1950s.

1958
The group that eventually becomes the **National Solid Waste Association** forms.

1959
The American Society of Civil Engineers publishes a **standard guide to sanitary landfilling**. It suggests compacting the refuse and covering it with a daily layer of soil to fight odors and rodents.

1960's
Plastic begins getting extensive use **as packaging**. Pop tops or **pull tabs on beverage cans** become popular.

Municipal collection and disposal increases over private collection in the late 1930s, but begins to lose ground in the 1960s. Private firms become more attractive to replace city services, offering cost savings and improved service. Regional agencies begin to emerge to meet increasingly complex problems.

Interest in waste-to-energy as a diversion alternative develops in the U.S.

1961
A city ordinance in Los Angeles eliminates the sorting of recyclables after Sam Yorty successfully runs for mayor with that as his campaign promise.

The Governmental Refuse Collection and Disposal Association forms. In 1991, the group changes its name to the **Solid Waste Association of North America**.

Proctor & Gamble begins test-marketing the **disposable diaper.**

1962
Rachel Carson's book **Silent Spring** is published. It carefully

FUN FACTS ABOUT PET

- Recycling a ton of PET containers saves 7.4 cubic yards of landfill space.
- The first PET bottle was recycled in 1977.
- The average household generated 34 pounds of PET bottles in the year 2000.
- Fourteen 20 oz. PET bottles yield enough fiber for an extra large T-shirt.
- It takes 14 20 oz. PET bottles to make one square foot of carpet.
- Half of all polyester carpet manufactured in the U.S. is make from recycled plastic bottles.
- It takes 63 20 oz. PET bottles to make a sweater.
- It takes 85 20 oz. PET bottles to make enough fiberfill for a sleeping bag.
- The PET bottle was patented in 1973 by chemist Nathanial Wyeth (brother of distinguished American painter Andrew Wyeth.)

Source: NAPCOR Corporation
information@napcor.com

outlines the deadly result of using the pesticide DDT and becomes the bible for the environmental movement.

1965
Aluminum cans for beverages are introduced.

The **Solid Waste Disposal Act** (SWDA), the nation's first federal solid waste management law—authorizes research and provides for state grants. It states that while state, regional, and local authorities primarily should be responsible for waste management, the federal government will provide financial and technical assistance. But the act has no regulatory authority.

1968
President Johnson commissions **the first comprehensive survey of solid waste** since cities began keeping garbage records in the early 1900's. Cities collect and dispose of 140 million tons of solid waste.

The U.S. aluminum industry begins **recycling discarded aluminum** products, from beverage cans to window blinds.

1969
Rubber reclaiming drops to 8.8 percent from 19 percent in 1958.

Seattle institutes a **new fee structure for garbage pickup**, which incorporates a base rate and an additional fee for garbage above a certain amount.

Also, a small collection company, American Refuse Systems Inc. merges with equipment distributor Browning-Ferris Machinery Co. to form **Browning-Ferris Industries, Inc**.

1970-1985

1970
The enactment of the **Clean Air Act** leads to the closing of many incinerators.

The **first Earth Day** focuses attention on environmental concerns. Recycling's chasing arrows logo is introduced on that day.

The **U.S. Environmental Protection Agency** (EPA) is created.

Congress passes the **Resource Recovery Act**. It shifts the emphasis of federal involvement from disposal to recycling, resource recovery, and waste-to-energy.

There are an estimated 15,000 authorized land disposal sites,

ANALYZE THIS!

A study at two University of Michigan dining rooms revealed that when napkins came from dispensers at the beginning of the cafeteria line, customers took an average of 3.3 napkins at every meal. When the napkin dispensers were placed on tables in the dining room, each person used an average of only 1.4 napkins per meal.

Source: *Inform Reports, Fall/Winter 1997*

but as many as 10 times that number of unauthorized dumps. A study in the mid-1970s states that **94 percent of the landfills surveyed did not meet the minimum requirement for a sanitary landfill**.

1970's

Resource recovery becomes increasingly popular in some circles, but others say it's not viable because it's not economically profitable. **Compactor trucks** comprise a majority of all collection vehicles.

The **EPA Office of Solid Waste** gets the authority to study solid waste, award grants and publish guidelines.

1971

Oregon passed the **nation's first bottle bill** as an anti-litter law. The law resulted in a dramatic reduction in beverage container litter and gained widespread public support. Four years after implementation, the bottle bill had a public approval rating of 90 percent.

The **U.S. Environmental Protection Agency** is created. It is charged with the mission "to protect human health and to safeguard the natural environment."

Waste Management, Inc. is formed.

1972

The first **buy-back centers for recyclables** are opened in Washington State. They accept beer bottles, aluminum cans, and newspapers.

A **bottle made from PET** (polyethylene terephthalate) is patented by chemist Nathaniel Wyeth (brother of Andrew Wyeth, the American painter).

1973

The **paper recycling rate drops** to 17.6 percent from 35 percent in 1944.

1974

The **number of incinerator plants drops to 160**, from 265 in 1966 and 600-700 in 1938.

The **first city-wide use of curbside recycling bins** occurs in University City, MO, for collecting newspapers.

Mid-1970's

The **EPA** proposes a drastic cutback in the federal solid waste program so the government can **focus on hazardous waste**, but the agency backs off after several public sector groups protest.

A REASON TO COMPOST

Grass, leaves, and other wastes from lawns and backyard gardens account for an estimated 18% of the annual municipal waste stream. The percentage and composition of yard wastes varies widely from season to season. During the summer, grass can comprise up to 50% of municipal waste. Leaf waste can account for as much as 60-80% in the fall.

Using leaves, grass clippings, and other organic matter, you can make a ton of compost at home in an area only four feet square.

Source: PA Department of Environmental Protection, 2002

Recycling one aluminum can saves enough energy to keep a 100 watt light bulb burning for almost four hours or power a television for three hours.

(Source: www.erie.oh.us/)

1975
The number of **private garbage hauling companies increases**. The percent of waste collected by private companies as opposed to municipalities is reported to be 66%.

1976
Congress passes the **Resource Conservation and Recovery Act** (RCRA) which requires all dumps to be replaced with "sanitary landfills." The enforcement of this act will increase the cost of landfill disposal and make resource-conserving options like recycling more appealing. It stands today as the primary piece of federal solid waste legislation and essentially replaced and built upon the Resource Recovery Act.

The **Toxic Substances Control Act** is passed, which helps prevent the dumping of hazardous chemicals in landfills.

Three people from Bartlesville, OK, get a patent on a method for **purifying and reusing lubricating oils**.

1977
PET soda bottles begin replacing glass.

1978
The U.S. Supreme Court rules that garbage is protected by the Interstate Commerce Clause, so **states can't ban shipment of waste from one state to the other**.

Also in 1978, 200 families are relocated from **Love Canal** (they did not begin returning until 1989) after it was determined that Hooker Chemical and Plaster Corp. had put 21,000 tons of chemical waste there 25 years earlier. They covered it up and then sold the property to the Niagara Falls Board of Education, which placed a school and playground on the site. Lawsuits for damages continued into the mid-1990's. The Love Canal incident is cited as a prime cause in the creation of the **Comprehensive Environmental Response and Reliability Act**, also known as **Superfund**, in 1980.

1979
The EPA issues landfill regulations that **prohibit open dumping**.

1980
Per capita production of waste reaches 8 pounds per day, up from 5 pounds in 1970 and 2.75 pounds in 1920.

1984
Reauthorization of RCRA and amendments to the Hazardous and Solid Waste Act call for **tougher federal regulation of landfills**.

1985-1999

1985
First Adopt-A-Highway program started in Texas to address litter along state-maintained roads.

1986
Rhode Island becomes the first state to pass mandatory recycling laws for aluminum and steel cans, glass, newspaper, and soda bottles (PET) and milk jugs (HDPE) plastic.

The city of **San Francisco meets its goal of recycling 25% of its commercial and residential waste**.

The **Fresh Kills Landfill on Staten Island, NY becomes the largest landfill in the world**.

1987
A Long Island garbage barge known as **Mobro 4000** leaves a New York port on March 22 with 6,000 tons of garbage bound for a southern landfill. The barge is rejected by the states of Louisiana, Alabama, Mississippi, Florida, and New Jersey, as well as Belize and Mexico. After a journey of 173 days, the load, mostly paper, is ultimately incinerated near the Long Island landfill from which it had originally been taken. The trip of the Mobro is followed on television and in newspapers and creates the impression that the U.S. does not have enough places to dump garbage.

The Institute of Scrap Iron and Steel and the National Association of the Recycling Industries merge to create the **Institute of Scrap Recycling Industries**.

1988
The EPA estimates that more than 70 percent, or at least **14,000 of the landfills operating in 1978 have since closed** because they didn't meet new higher landfill standards.

In an effort to divert waste from landfills, Assistant EPA Administrator Winston Porter sets a **U.S. recycling goal of 25%** to be met in the next four years. The goal is met in 1996.

Medical waste washes up on eastern U.S. beaches. One result is the **Medical Waste Tracking Act**, a two-year plan to set up procedures to track these hazardous wastes.

The **Plastic Bottle Institute develops a material-identification code system for plastic bottle manufacturers**. (This is our current #1-6 system.) ⟶

1989
Arizona archaeologist **William Rathje recovers corn-on-the-cob intact after 18 years in an Arizona landfill**, indicating

ID Code for Plastics

1 = PET = Polyethylene Teraphthalate
Common uses: soft drink bottles, some fruit juices, alcohol beverage bottles

2 = HDPE = High density polyethylene
Common uses: milk jugs, distilled water, grocery bags, laundry and dish detergent, motor oil, bleach and lotion

3 = V = Vinyl/Polyvinyl Chloride
Common uses: vegetable oil bottles, mouthwash, salad dressings

4 = LDPE = Low density Polyethylene
Common uses: bags for dry cleaning, bread, produce and trash and for food storage containers

5 = PP = Polypropylene
Common uses: battery cases, dairy tubs, cereal box liners, bottle caps & lids, disposable diaper linings

6 = PS =polystyrene
Common uses: yogurt cups, clear carry-out containers, vitamin bottles, spoons, forks and knives, hot cups, meat and produce trays, egg cartons, clamshell carry-out food containers

7 = Other types of plastics
Plastics with a seven (7) are made from a type other than the six most common types listed above or they can be made from multiple layers of different types of plastics.
Common uses: squeezable ketchup bottles, most chip snack bags, juice boxes (individual servings).

Kansas State University Cooperative Extension
www.healthgoods.com

that just because we put biodegradable trash in a landfill, doesn't mean it will decompose and become smaller in size. People had thought that as food wastes decomposed in landfills, it would allow us to increase their capacity.

Laws requiring recycling to be an integral part of waste management **have been enacted by 26 states**.

1990
Nationwide, **140 recycling laws have been enacted.**

McDonald's announces plans to stop the use of polystyrene packaging of its food due to consumer protests.

1990's
Consolidators like Recycling Industries Inc., Philip Services Corp. and Metal Management Inc. emerge in the scrap business, changing the face of a family-run industry.

1992
Federal Resource Conservation and Recovery Act (RCRA) establishes minimum standards for landfills, designed to make them safer. These standards include location, facility design and operating criteria, and closure and post closure care requirements, financial assurance, ground water monitoring, and corrective action. Because of the cost of meeting these requirements, 10,000 small municipal landfills are consolidated into an estimated 3,500 new, safer landfills, some of which are "megafills" that can handle up to 10,000 tons of waste a day. The new landfills are outfitted to prevent air and water pollution and limit the spread of disease by scavengers.

1994
The U.S. Supreme Court holds in its review of C&A Carbone v. Clarkstown, NY, that flow control, **the practice whereby municipalities can direct the disposal of waste to designated facilities, is unconstitutional**.

1995
New York City law officials move to break the mob-controlled waste-hauling cartel in the city with indictments of 17 people, four trade associations and 23 companies.

1996
An attempt to pass a solid waste flow control bill in the U.S. House of Representatives **fails**.

1997
EPA increases America's recycling goal to 35% by 2005.

1998
Seven years of consolidation of solid waste companies

THE U.S.

- Has ***only 5%*** of the world's population, yet generates ***19%*** of its waste
- Uses 20% of the world's metals
- Uses 24% of the world's energy
- Uses 25% of the world's fossil fuels

E/The Environmental Magazine March April 97

DID YOU KNOW?

For each full bag of garbage that we take to the curb, the primary resource industry creates the equivalent of 71 full bags of waste.

OR

1 full bag of household garbage

=

71 full bags of waste produced by the primary resource industry

(Source: Recycling Council of Ontario)

reaches its peak when the largest in the U.S., Waste Management, merges with the number three company, USA Waste, whose management takes over the new Waste Management.

1999
The new number three hauler, Allied Waste Industries Inc., agrees to buy the number two company, Browning-Ferris Industries, in a deal worth more than $9 billion.

2000
Biocycle and Zero Waste America, nonprofit organizations, estimate that Americans recycled 33 percent of the waste they generated, and that .66 tons of waste were disposed per person.

2001
Biocycle and Zero Waste America estimate that Americans disposed .98 tons of trash for each citizen and 32 percent of the waste generated was recycled.

2002
The Fresh Kills Landfill on Staten Island was reopened to accept the 1.2 million tons of debris from the World Trade Center following the September 11 terrorist attacks.

Sources:

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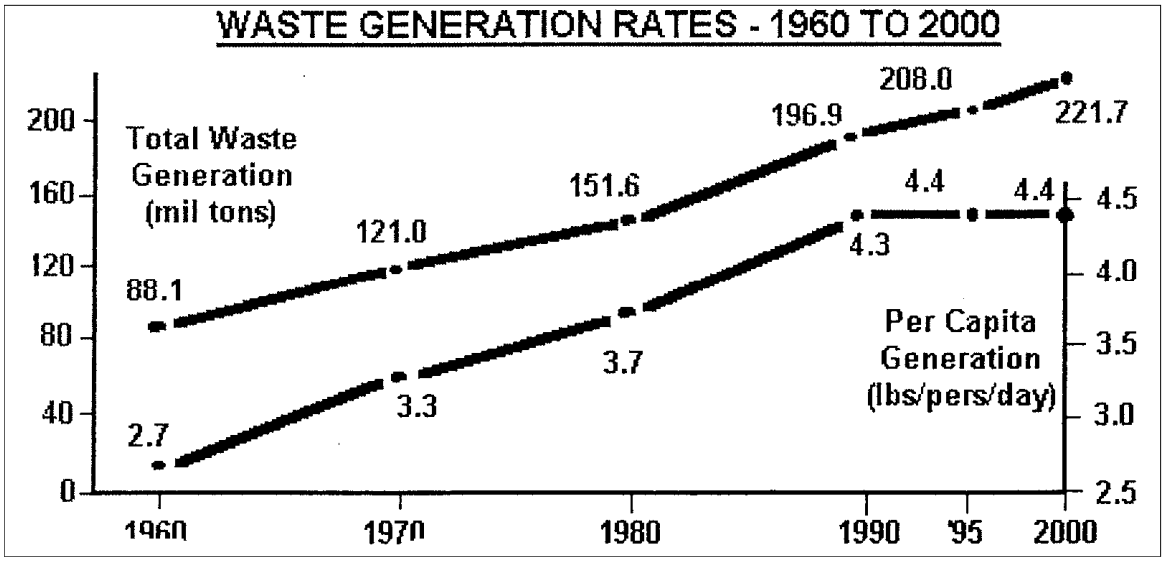


Increased Waste Generation

There are several related issues that lie at the root of our waste problem.

- Increased population
- More mobility
- Advanced technology

With an increase in population and more advanced technologies, people are more mobile and use more disposable products, and there are more people generating waste.

World population has grown by 1.98 billion (3.698 billion in 1970, 5.675 in 1995). Just this increase of 1.98 billion is equal to the entire population of the world in 1929. In the last 25 years the U.S. population has increased by some 60 million, which was the entire U.S. population of 1886! The world population in 1950 was 2.6 billion. In 2000, our population stands at 6 billion worldwide.

More people travel farther and more often than earlier generations. In 1995, 200 million vehicles were registered in the U.S. People traveling to and from work spend many hours in their cars each day, often eating snacks and drinking beverages. Many families eat one or two meals on the run, at the game or in the car. Keeping our cars free of litter and trash has become a weekly task for most of us.

New technology has given rise to changes in our packaging of products. Packaging is designed for convenience, protection of the product and to promote product sales, not with biodegradability or conservation in mind. Many items we use regularly are designed to be disposable or single use: disposable diapers, throw away razors, individual serving size containers. The fast food we eat is packaged in cans, bottles, polystyrene, paper and plastic containers. Think of all the packaging that we throw away each day.

Lack of education and caring has allowed people to become wasteful over-consumers. In addition, we have limited natural resources so that at some point, production and use will have to be limited as well.

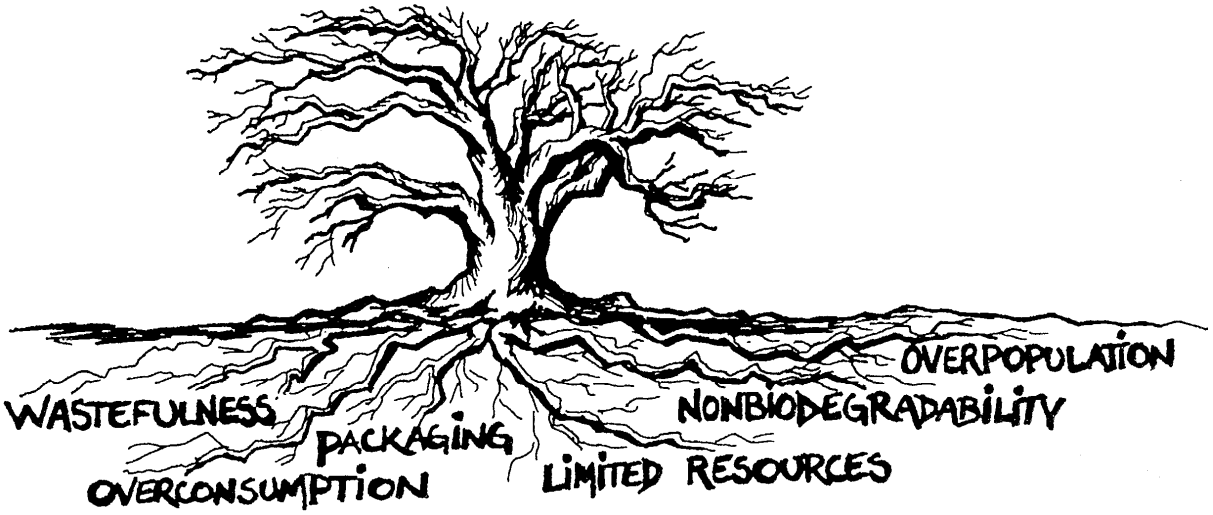
With more waste being generated, more waste is escaping proper disposal. Litter and illegal dumping have become major problems receiving more public attention.

WHAT ABOUT THIS!

- Americans have increased their use of paper during the past 30 years. In 1997, **the average American used 739 pounds of paper**, almost twice as much as in l960, according to the Environmental Defense Fund.
- **Containers and packaging** comprise a large percentage of the American waste stream, **72.4 million tons** annually.
- During the 5-week period between Thanksgiving and Christmas, waste generation in the U.S. increases 20 %, according to Use Less Stuff, published by the Cygnus Group.

Source: MSNBC.com, December, 2000

Roots of Our Waste Problems



Produce Less Waste by Practicing the 3 Rs

Reduce the amount and toxicity of trash to throw away.

Reuse containers and products; repair what is broken or give it to someone who can repair it.

Recycle as much as possible and buy products with recycled content.

Reduce:

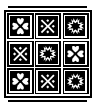
- Buy fewer new products.
- Buy only amounts of paint and household cleaners and garden products that you actually need.
- Share items with friends, co-workers, and neighbors (e.g. specialty tools) or rent them.
- Buy food in bulk (or large packages).
- Buy durable, repairable products.
- Reduce purchases of non-recyclable items (polystyrene, etc.).
- Buy items with minimum packaging.
- Bring your own shopping bags.
- Bring your own mug.
- Share a magazine subscription or book with a friend.
- Use your library instead of buying books and magazines.
- Request “no bag” for small purchases.
- Use cloth napkins, kitchen towels and sponges instead of paper.
- Write the manufacturers of overly packaged products.
- Reduce junk mail by writing The Direct Marketing Association at 6 East 43rd St., PO Box 3861, Grand Central Station, New York, NY 10163, and ask to be eliminated from any new mailing lists. To get off existing mailing lists, write or call the companies directly. Many companies have toll-free numbers and postage-paid envelopes. You can also refuse unwanted mail by writing “Refused, Return to Sender” across the unopened envelope and drop it in the mailbox without any additional postage. Or, register online at www.junkbusters.com.

Reuse:

- Reuse plastic and paper bags.
- Donate ribbon pieces, egg cartons, etc., to preschools for arts & crafts projects.
- Take your magazines to your doctor's office or hospital waiting rooms to share them.
- Use comics for wrapping paper.
- Line your garden beds with seven layers of old newspapers, then apply mulch.
- Create mini-greenhouses for your plants from used milk jugs

or soda bottles.

- Plant seeds in used beverage containers and watch them grow.
- Wear hand-me-down clothes.
- Use tattered T-shirts and other clothing for car polishing and cleaning rags.



- Save your favorite old clothing and make a quilt or have one made for you.
- Return wire coat hangers to the dry cleaners.
- Donate usable furniture and clothing to thrift shops or have a yard sale.

- Make double-sided copies when using copier machines.

Recycle:

- Recycle paper, newspapers, plastic containers, metal, aluminum beverage cans, glass, motor oil, batteries, and anti-freeze.
- Recycle your used appliances and vehicles at your local scrap dealer's yard.
- Recycle tires at local collection events, if available, or ask your county recycling coordinator where you can recycle them.

- Recycle ink and toner cartridges at the store where you purchased them, or send back to the manufacturer. Some counties have local collection events for these items.
- Request recycled paper for photocopying.
- Ask your bank, phone, gas and power companies to use recycled paper for their bills, notices, and statements.
- Ask your employer to use recycled paper and participate in your local curbside program or take your recyclables to drop-off locations. To learn about your nearest locations for recycling, go to www.1800cleanup.org and type in your zip code.

Buy Recycled:

- Look for products that contain recycled content and purchase them to close the loop on recycling. If you're not "buying recycled," you're not recycling.
- Shop at businesses offering recyclable or biodegradable products or packaging.
- At the grocery store, check for environmental symbols on the labels of cereal, cookie and cracker boxes and laundry detergent and cleaners for containers using recycled content.
- Purchase recycled paper stationery and office paper.
- Check out the **Pennsylvania Recycled Products Manufacturers'** list on the PA Department of Environmental

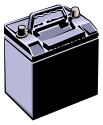
More Facts!

Log onto:
www.obviously.com/recycle/

And Find:

- World's Shortest Comprehensive Recycling Guide
- Beyond the Curbside
  - Recycle cell phones
  - Floppy disks, CDs
  - Computers
  - Glasses

Protection website at www.dep.state.pa.us by typing in "buy recycled" into the "direct links" window and learn where you can get products like these made in Pennsylvania:



- Automotive supplies including batteries, recycled motor oil, and even automobile carpet.
- Bottles and containers made by Owens-Brockway which recycles glass or high-density polyethylene (HDPE) milk jugs and laundry detergent bottles made into new containers by Graham Packaging Company in York.
- Building materials like plastic lumber for picnic tables, fences, and decks made from milk jugs; insulation made from newspapers; and even ceiling tiles made by Armstrong World Industries of Marietta from old newspapers and phone books! Carlisle Tire and Wheel Company makes playground surfacing and mats from tires!
- Cans and metals are recycled by such companies as the U.S. Steel - Edgar Thompson Works in Braddock.
- Clothing and accessories products include rag rugs made from old clothing in Dillsburg to plastic soda bottles turned into clothing by firms like Good Heavens of Narbareth and Performance Sports Apparel of Reading.

- Yard wastes are made into compost and mulch by a number of companies, and the Henry Molded Products Company of Lebanon makes flower and nursery pots from old newspapers and mixed office paper.
- Such companies as Sonoco of Downington, making paper tubs and packaging partitions from old corrugated cardboard and newspapers create packaging materials.

- Paper and office supplies are recycled and remanufactured by such firms as Greenline Paper Company of York making new office paper from old office paper; American Termoplastic Company of Pittsburgh making loose-leaf binders from used polyvinyl chloride (PVC); ink cartridges are refilled, and even office furniture becomes new again thanks to Pennsylvania companies.
- Recycling and refuse containers are made from milk jugs and detergent bottles you place in your curbside bin by Rehrig Pacific Company of Erie and Windsor Barrel Works of Kempton.

- For further information about recycling, contact your municipal or county recycling coordinator or solid waste authority. The Pennsylvania Department of Environmental Protection also has recycling information on its website at www.dep.state.pa.us.
- To get a list of recycled products made in Pennsylvania, contact the Pennsylvania Resources Council at www.prc.org.

The above suggestions are only a partial list of the many ways individuals can contribute toward solving the solid waste problem. As a teacher and role model, the influence you can have on others is powerful. Many families now recycle as a result of students coming home and encouraging the practice. Many schools now have recycling programs and have eliminated the use of many plastics and polystyrene from their food service programs because of students organizing the programs or showing the administration how cost-saving this can be. DEP or your county recycling coordinator can tell you how to set up a recycling program in your school.

The recycling symbol stands for the 3 Rs:

- **Reduce**
- **Reuse**
- **Recycle**

To "close the loop" we need to "buy recycled".

Some Used Oil Facts

- Do-it-yourself oil changers in Pennsylvania dispose of 11 million gallons of used oil each year.
- It is estimated that at most 14% (1.5 million gallons) of this oil is recycled.
- The other 9.5 million gallons of used oil is dumped—into sewers, on the ground and into the trash.
- Used oil is the largest single source of oil pollution (over 40%) in our nation's waterways.
- Just one quart of oil is enough to create a two-acre sized oil slick on surface water.
- A gallon of used oil can ruin a million gallons of freshwater—a year's supply for 50 people.
- If all the oil generated by "do-it-yourselfers" were recycled, it would save Pennsylvania 103,000 barrels of oil per day.
- If all the used oil disposed by do-it-yourselfers in Pennsylvania were recycled, it could produce enough energy to power 17,100 homes annually.


Whatever befalls the Earth
Befalls the children of the earth
Man did not weave the web of life
He is merely a strand in it
Whatever he does to this web
He does to himself
1854 Chief Seattle

Litter

When was the last time you saw someone littering? It may be hard to remember. But litter doesn't just appear—it's the result of carelessness or intentional bad behavior. Is there anything you can do? Knowing more about litter and where it comes from is a good place to start.

Americans go through 2.5 million **plastic bottles *every hour*,** only a small percentage of which are now recycled.

Environmental Defense Fund, 1977

Why do people intentionally litter?

Keep America Beautiful, a national litter education and prevention organization, has found that people intentionally litter for three reasons:

- **They feel no sense of ownership, even though areas such as parks and beaches are public property.**
- **They believe someone else—a park maintenance or highway worker—will pick up after them.**
- **Litter has already accumulated so it's OK for me to litter**.

Rapid growth, increasing mobility, and improper disposal habits cause the existence, growth, and accumulation of litter.

Attitudes can also get in the way of responsible habits. Some people think it is "not cool" to be careful with their trash or to recycle cans and bottles. It is not uncommon to see people with others (or in groups) walking down the street eating and dropping their wrappers, tossing their cans, and flicking their cigarette butts. Getting people to change their habits and attitudes takes time and education, and this often doesn't happen until the consequences get costly enough.

Accidental vs. Intentional Littering

According to national statistics, accidental littering occurs more frequently than deliberate littering. Littering can be a deliberate act such as throwing fast food wrappers and drink containers out of the car or leaving newspapers on a park bench. However, litter blows out of vehicles or from uncovered loads, animals get into curbside trash and the wind blows it around, or people toss trash into overfilled dumpsters and wind or weather cause it to be scattered about. People also drop, lose and forget things. In fact, a study in Pennsylvania has shown that as much as 65% of the rural litter is accidental. Of course

this number varies from area to area.

Who litters?

Motorists and pedestrians are often the only ones blamed for litter; however there are actually seven primary sources:

- Household trash handling and its placement at the curb for collection
- Dumpsters used by businesses
- Loading docks
- Construction and demolition sites
- Trucks with uncovered loads
- Pedestrians
- People in motor vehicles
- Everyone (accidentally)

Only twenty percent of litter is generated by people in motor vehicles and pedestrians. The litter is then blown about by wind and traffic or carried by water. It moves until trapped by a curb, vegetation, a building, or fence. Once litter has accumulated, it invites people to add more.

Problems caused by litter

When litter is on sidewalks or along roadways, it often gets flushed into storm drains during a heavy rain. Eventually this water leads to the nearest waterway or large body of water. People use this water either for drinking or recreation.

Almost ***80% of ocean debris can be traced to land-based sources*** such as inadequately treated municipal waste, storm water runoff, beach use, and littering. This trash is washed, blown or dumped on land, eventually ending up on our beaches or floating out to sea, where ocean currents may take it hundreds of miles from its launching point. Seagulls dragging a piece of fishing line, pelicans with six-pack rings around their necks, or sea lions struggling to remove a piece of discarded fishnet are some common examples of the problems marine debris causes wildlife. In addition, sea birds, sea turtles and whales have been known to mistake floating plastic pellets and plastic bags for natural prey, such as fish eggs, jellyfish and squid. Ingesting plastic can cause internal injury, blockage of the digestive tract and starvation in these animals. Other impacts of marine debris include navigation hazards, such as plastic rope or line that may entangle propellers, or plastic bags and sheeting that may clog the intake valves to engines.

Careless dumping of household hazardous wastes such as

World's Largest Landfill!

The Fresh Kills Landfill, located on the western shore of Staten Island in New York, ***is so large it can be seen with the naked eye from space***. Its highest mound is only slightly shorter than the Washington Monument. First opened as a "temporary" facility in 1947, today Fresh Kills is the largest landfill in the world.

The legality of this landfill is also questionable. Operating under a series of federal consent orders, ***it is unlined and leaches thousands of pounds of toxic chemicals and heavy metals into nearby rivers*** which flow into the ocean. Its odor reaches into neighborhoods on both sides of the Arthur Kill, which separates Staten Island from New Jersey. It will be a ***likely Superfund candidate for the next century***.

The 3,000 acre site was scheduled to close Jan. 1, 2002, however it was reopened to dispose of debris from the World Trade Center bombing.

Big Apple Garbage Sentinel
www.pratt.edu

paint, thinner, pesticide, oil, and fuel can percolate into the surrounding soil and cause significant ground water pollution. This can be a serious threat to homeowners who use wells for their water supply. Most homeowners do not have their wells tested until someone gets sick.

Damage caused by litter is by no means limited to humans. Important ***plant communities and wildlife habitats are lost to our waste*** each day. Many wild animals are injured or killed by litter carelessly tossed by humans. Small rodents like mice and chipmunks may be trapped in or cut by glass bottles. Ducks, geese, and other birds often get their heads and necks caught in plastic six-pack rings. Surface and groundwater become polluted and unable to sustain healthy plant and animal life.

Often people think that throwing food waste, such as apple cores or half-eaten sandwiches, out the car window is OK. The food will either be eaten by animals or naturally decompose over time. Roadside food litter does attract small rodents, and small rodents attract birds of prey subsequently hit by passing vehicles as they dive in to catch these feeding mice and other animals. Rehabilitation specialists at the Shaver's Creek Wildlife Rehabilitation Center in Pennsylvania have determined that a significant number of the injured birds of prey that are received at their facility, have been hit by vehicles while diving in pursuit of their food.

Litter can be very dirty. Not only is it ugly, but ***it may carry germs***. Scavengers such as rats are attracted to areas with lots of litter. They find their food among the trash and can pick up the germs and become carriers for diseases that may make people sick. In some places, we find hazardous waste such as used needles and other drug paraphernalia. People can get sick from the diseases they get from contact with these items.

Because litter is exposed to the elements, it may start to decompose. This can result in a ***foul smell.*** This means that not only do our parks and recreation areas look uncared for, but they become unhealthy and we have fewer places to play.

Litter is a ***huge problem to farmers***. Cattle and other grazing animals can die from ingesting metal (known as hardware disease), glass and plastics that gets baled into hay or chopped into silage. Expensive repairs to combines and other harvesting machinery jammed by trash thrown into fields means downtime, lost crops if they get rained on, and costly loans to cover these expenses. Time and money lost repairing tractor tires damaged by broken bottles and shredded cans can mean the difference between survival and losing the family farm, particularly for farmers who already struggle in today's economy. Even if the animals don't try to eat the litter, they may get entangled in it and injure themselves.

There is no waste in nature

There is no such place as away

The Earth has limits

Everything is connected

Veterinarian bills are also costly and if a mature dairy cow should die, it could cost the farmer $1500 to replace it.

What does litter cost?

Litter removal is costly. Nationwide, highway departments spend millions of dollars and many hours each year to pick up litter—money and time needed for more important services. Local, state and federal governments also spend millions removing litter left by careless park and forest visitors. Data on the cost of litter removal is not documented the same across the country. However, state budgets typically include funds for litter pick-up on state highways. Pennsylvania's Department of Transportation spends $6 million annually picking up after people. Florida and Texas spend approximately $3 million each year, Kentucky spends $4 million each year, and the state and local governments of Louisiana expend nearly $10 million each year on litter removal and illegal dump cleanup combined.

The negative impact of litter also "costs" a community. The cost to a community that suffers from many littered areas can be very high when it comes to "first impressions". Clean communities have a much better chance of attracting new businesses and residents than those where litter is common. Several cities have received negative feedback about their littered community from potential new businesses and families wanting to move to the area. These ***"missed opportunities"*** are costs that are hard to measure.

Litter wastes our natural resources. When cans and bottles are discarded on the roadside instead of being recycled, it means that even more resources must be used to create cans and bottles from new materials.

Virtually every state and community across the country, as well as many other countries, faces the problems of litter and illegally dumped solid waste. Not only does improper disposal make an area unsightly, but litter and dump sites can lower property values and diminish community pride, and create a hazard for all living things.

NIMBY

"Not In My Backyard!" That's often our response to the solid waste disposal question. Did you know that three times more sanitary landfills and waste facilities are located in areas with a high proportion of racial minorities?

In places where people have access to political power it is nearly impossible to site waste facilities. Therefore, some waste companies and local land use agencies have followed the path of least resistance to the backyards of minority populations.

NIMTOO

"Not in My Term of Office" is a reaction of some politicians who refuse to implement tough solid waste laws such as mandatory trash collection which they perceived as costing them their office at re-election time.

Illegal Dumping

Illegal dumping is disposal of larger quantities of waste (versus litter which is generally only a few small items) in an unpermitted area. It is also referred to as "open dumping," "fly dumping," and "midnight dumping" because materials are often dumped in open areas from traveling vehicles along roadsides, and late at night. Illegally dumped wastes are primarily nonhazardous materials that are dumped to avoid either disposal fees or the time and effort required for proper disposal. These materials typically include:

- **Tires**
- **Bags of household trash**– daily garbage can include household hazardous wastes such as paints, motor oil, and household cleaners such as bleach and ammonia. Disposable diapers also present a serious health concern.
- **Appliances**—refrigerators, washers and dryers, hot water tanks, etc.
- **Bulky items**—furniture, TVs, carpets, etc.
- **Vehicle parts** including gas tanks, car parts, and oil filters, batteries, etc.
- **Construction/Remodeling debris** –shingles, siding, wood, wallboard, toilets, bathtubs. Also, concrete, bricks and other "clean fill" items. Usually from do-it-yourselfers.
- **Compostable materials**– brush, grass clippings, Christmas trees, leaves, etc.
- **Stolen items**

Wastes such as scrap tires, bulky items, and yard waste may be illegally dumped because they are banned from landfills or their proper management can be costly. Residential and commercial wastes may be illegally dumped in areas that lack or have costly pickup service.

Sites used for illegal dumping vary but may include abandoned industrial sites, residential or commercial buildings; vacant lots on public or private property; and infrequently used alleys or roadways. Because of their accessibility and lack of lighting, areas along rural roads, railways and abandoned strip mines are particularly vulnerable. Illegal dumping can occur at any time of day but is more common at night or in the early morning hours.

If not dealt with, illegal dumps often attract more waste, potentially including hazardous wastes such as asbestos, household chemicals and paints, automotive fluids and commercial or industrial wastes.

Why People Dump Illegally

Unlike litter, there is no accidental illegal dumping. Illegal dumping is an intentional act. It is difficult to profile a "typical"

Working Together To Fight Littering & Illegal Dumping

A guide to working with enforcement agencies in Pennsylvania

This book provides information about the agencies responsible for enforcing the codes, the penalties involved, and guidelines for citizens when reporting illegal dumping to enforcement agents. It's the only book of its kind in the state.

by
PA CleanWays, Inc.
Greensburg, PA 15601

Call (724) 836-4121
or
Email -

The Environmental Protection Agency has developed a guidebook on illegal dumping which is an excellent source for communities to address the issue. If interested, check it out at:
www.epa.gov/region5/dmpguide.htm

illegal dumper. Research indicates that socioeconomic factors are not a dependable predictor of illegal dumping. Some individuals will choose to engage in illegal dumping despite the convenience or efficiency of the collection and disposal services. The stereotypical dumpers– the "Midnight Joes" out to make a quick buck- are not the only ones polluting our land and waters. These are other reasons why people dump their trash illegally.

- Missed collection day or need to get rid of trash (moving)
- Too costly
- Hauler won't accept large items
- Too inconvenient
- Hide other activity (In some cases, illegal dumpers are also breaking other laws relating to vehicle licensing, insurance, drug possession or theft. Sometimes kids want to dispose of evidence of a party while parents were out-of-town.)
- Making a buck (Midnight Joe or a more sophisticated operator who claims to be a transfer station or recycler.)

Problems Caused by Illegal Dumping

All of the problems caused by littering (page 24), are, of course, magnified when it comes to illegal dumping. Additionally, illegal dumping causes the following problems:

- The ***health risks*** connected with illegal dumping are significant. Areas used for illegal dumping may be easily accessible to people, especially children, who are vulnerable to the ***physical*** (nails sticking out, sharp edges) ***and chemical*** (harmful fluids or dust) ***hazards*** posed by wastes. Rodents, insects, and other vermin attracted to dump sites may also pose health risks.
- Dump sites with scrap tires are an ideal breeding ground for mosquitoes, which can multiply 100 times faster than normal in the warm stagnant water that collects within the tires. Severe illnesses have been caused by ***disease-carrying mosquitoes*** originating from scrap tire piles.
- Some neighborhoods have been evacuated and significant property damage caused from dump sites that have caught on ***fire***, either accidentally by ***spontaneous combustion*** or, more commonly, on purpose by ***arson.*** Sites where there are a large number of tires are particularly attractive to "firebugs." In rural areas, ***burning*** at dump sites can cause forest fires and severe erosion as fires burn away trees and undergrowth.
- Illegal dumping can interfere with proper drainage or runoff, making areas more likely to have ***flooding*** when wastes block ravines, creeks, culverts, and drainage basins.
- Runoff from dump sites containing chemicals may ***contaminate wells and surface water*** used as sources of

HHW
Household Hazardous Waste

The York County Solid Waste Authority was the first Pennsylvania municipality to sponsor a household hazardous waste (HHW) collection program in 1985 and continues to sponsor a program yearly. Permanent facilities for HHW collection have been established in Lancaster and Lehigh, Northampton, Monroe, and Schuylkill counties.

Source: PA Department of Environmental Protection, 2000

drinking water.

Dump sites serve as magnets for additional dumping and other criminal activities. As a result of illegal dumping, property values decrease, and the community becomes unattractive to further home and business development. Without the tax income that comes from new development, funding to establish and maintain effective illegal dumping enforcement programs is limited. In the end, it is often the development of areas surrounding illegal dump sites that stops the problem, because offenders are more likely to be seen.

Cost of Illegal Dumping

The costs to local government and property owners connected with the continuous clearing of illegally dumped waste materials are high. Some urban areas have reported spending several million dollars per year on cleanup, hauling and disposal of this illegally dumped trash. These costs are passed along to local residents in the form of higher service fees or property taxes. Local governments need to put into action and enforce ***both*** the state and local laws. To do so, many municipalities would have to increase the number of their enforcement officers which could be a significant increase in their budget.

At the same time, local governments are burdened by and must respond to litter and illegal dump activities. The local public works departments typically budget funds for litter pick-up and illegal dump clean-up. The City of Los Angeles spends over $4 million annually to clean up approximately 121,000 tons of trash at illegal dump sites. The District of Columbia's Department of Public Works spends nearly $1 million each year cleaning up illegal dump sites. The City of Berkeley, California cleans up approximately 160 tons of illegally dumped items each year at a cost to the city's taxpayers of over $100,000. A City of Philadelphia study determined that illegal dumping activities cost the city $5 million dollars annually.

What Factors Contribute to the Problem?

Where You Live

If a community has limited access to convenient, affordable waste disposal facilities or services and recycling, illegal dumping is generally a problem. In lower-income areas, residents may not be able to afford trash pickup and disposal fees. These areas may also have gang– or drug-related activities and high crime rates, which often result in illegal dumping being given a low priority by law enforcement officials and prosecutors. The problem tends to be worse in areas with a

high population of renters who have less stake in the community or absentee property owners who do not know or respond to problems. Residents in rural areas, where illegal dumping is common, may not question a lifetime practice or may not be aware of the laws or understand how harmful it is.

Physical Characteristics

In rural areas, illegal dumping occurs in remote or isolated places that are relatively easy to access. In urban areas, property with easy access such as empty lots, abandoned buildings, unused factories and remote spaces, are inviting to illegal dumpers. Areas with vacant properties tend to have more illegal dumping because the chances are that no one will be seen dumping or, if seen, will not be reported.

Other areas include poorly lit side roads, property along railroads, highways and alleys, charity drop box locations (Goodwill, Salvation Army), and construction sites or public areas with waste containers. Forest preserves, wooded sites, hillsides and farms (especially those near heavily populated areas) are often targets for illegal dumping because they are dark and few people are around. The borders of cities and counties tend to have more illegal dumping because police are less likely to be on the fringes of their districts.

Illegal dumping occurs near junkyards, active or closed landfills, solid waste transfer stations, and temporary dump sites at construction sites when dumpers want to avoid disposal fees or find that a site is closed or refuses to accept their waste. Also, the presence of trash attracts more trash. Once there is something dumped, it seems to give others permission to dump there, too.

Natural disasters, particularly flooding, result in damaged appliances, wrecked furniture and demolition debris that may lead to widespread illegal dumping.

Lack of Affordable and Convenient Waste Disposal and Recycling Programs

Areas without regular or affordable pickup service for trash and recyclables tend to have more household and yard waste dumping. Items that are not allowed in landfills, such as yard waste, scrap tires, Freon-containing appliances and car batteries may be illegally dumped unless there are alternate programs available which will take them.

Lack of Enforcement

Illegal dumping is a problem in many areas because of a lack of enforcement of laws prohibiting open dumping or burning of wastes. Both of these activities break federal and most state

What Can I Do?

- Set an example for others, especially children, by not littering and by picking up litter.
- Carry a litterbag in your car. (Hint: Open glove compartment and place hole of litter bag over locking mechanism)
- Make sure trash cans have lids that can be securely fastened. If you have curbside trash collection, don't put out loose trash in boxes or other open containers.
- Bundle newspapers in a paper bag before placing them in a curbside recycling bin.
- Encourage business owners to check dumpsters daily to see that top and side doors are closed.
- If you or a member of your family is involved in a civic group, scouting, or recreational sports program, encourage the group to "adopt" a spot in your town and maintain it on a regular basis.
- Report areas where people have illegally dumped garbage and debris to your local highway, public works, or conservation office, and ask that the material be removed. Offer your assistance.
- Volunteer to help organize a cleanup.

laws, but enforcement by local authorities is often a low priority. They are also difficult to enforce because some judges require actual witnessing of the act. In some cases, the fines for dumping are less than the costs for proper disposal, and dumpers consider the fines to be simply a lesser cost of doing business.

Some people think that lack of effective laws is the problem, but generally, laws are in place and if there aren't local laws there are plenty of state laws. The biggest problem is "enforcing" the laws.

Source: Environmental Protection Agency, Region 5 Guidebook

Waste Management and Littering and Illegal Dumping Laws

Laws are made by people at the local level by borough, township, city, and county officials, at the state level by legislators, and at the federal level by Congress. Federal laws affecting the environment, such as water and air quality and waste management, are enforced by the U.S. Environmental Protection Agency. These laws are like an umbrella covering all 50 states. The states then make laws conforming to the federal laws, but they may be stricter, depending on local issues and environmental concerns of the people.

In Pennsylvania, the legislature enacted the **Pennsylvania Municipal Waste Planning, Recycling, and Waste Reduction Act**, known as Act 101, in 1988. The act came on the heels of federal regulations passed about the same time that regulate waste hauling, handling of municipal solid waste, hazardous waste, and new laws on the construction of landfills. Those new laws resulted in the closure of many landfills located just outside of individual communities, because they were not lined and did not comply with the new regulations. Numerous landfills were then constructed with liners to better protect groundwater.

Pennsylvania's Act 101 places the responsibility of collection of municipal waste with municipalities, cities, boroughs, and townships. Counties must adopt waste management plans and provide for disposal capacity for waste generated by people in each county. Typically, capacity is assured through contracts between county officials and landfills or waste-to-energy facilities, which incinerate trash.

The act also set new standards for recycling in Pennsylvania, requiring all communities with 5,000 or more people and a population density greater than 300 people per square mile to recycle at least three items. Schools, institutions, commercial establishments, and businesses in those communities are also required to recycle. The act set 25 percent of the waste stream generated by Pennsylvanians as a recycling goal. When the goal was met, the state legislature then adopted Act 57 of 1997 which set a new goal of 33 percent.

To help communities set up recycling programs, Act 101 imposed a $2 per ton fee on each ton of trash disposed at Pennsylvania landfills or incinerators. The fee, reauthorized by Act 57, is used to fund grants to counties and municipalities for recycling programs. Funding for these Growing Greener Grants, as they are called, was approved again in 2002 by upping the tipping fee to $4 for each ton of trash disposed at Pennsylvania landfills or incinerators.

Communities that are required to recycle, known as mandated communities, adopted local laws, or ordinances, to make local requirements for their recycling programs. Local ordinances also may determine how trash is collected at the curb, may prohibit open burning and dumping on private and public property, may require permitting or licensing of waste haulers, and may provide for contracting with waste haulers.

While some local governments prohibit littering and illegal dumping through ordinances, the activities are also prohibited by a number of state laws. Local police or code enforcement personnel may enforce the local laws. Pennsylvania State Police, Game and Fish Commission officers, or Department of Environmental Protection staff may enforce state laws.

Penalties for violating local, state, or federal laws, may include the following:

- Paying fines
- Going to jail
- Having your vehicle taken away from you
- Having to pay for site cleanup or security
- Taking ownership of your property
- Taking away your licenses or permits
- Requiring you to perform community service activities

Some of the fines and penalties collected are used for litter or illegal dumping prevention programs. For example, some fines collected may be placed in accounts used to pay citizens as reward money, or the money can be earmarked for illegal dump cleanups. Sometimes judges require people found guilty of breaking these laws to perform environmental community service projects such as trash cleanups or beautification projects.

Federal Environmental Laws

National Environmental Policy Act of 1969
NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals and provides means for carrying out policy.

Clean Air Act 1970
The Clean Air Act is the comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. EPA to establish National Ambient Air Quality Standards to protect public health and the environment.

The goal was to set and achieve standards in every state by 1975. The Act was amended in 1977 to reset goals (dates) since many areas of the country had failed to meet the deadlines. The 1990 amendments to the Clean Air Act were intended to meet unaddressed or insufficiently addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion and air toxins.

Federal Insecticide, Fungicide, and Rodenticide Act 1972
The primary focus of FIFRA was to provide federal control of pesticide distribution, sale and use. Anyone using pesticides must take exams for certification, register when purchasing them and follow strict guidelines when using them, so they will not cause unreasonable harm to the environment.

Endangered Species Act 1973
The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. Species of plants and animals are listed and the law prevents any action that results in the "taking" of a species, or adversely affects their habitat. The regulation of pesticides is included in this law.

Safe Drinking Water Act 1974
This act was established to protect the quality of drinking water in the U.S. This law focuses on all waters, whether above ground or underground sources.

Resource Conservation and Recovery Act 1976
RCRA (pronounced "rick-rah") gave EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous wastes.

The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites.

The federal Hazardous and Solid Waste Amendments (HSWA) (pronounced "hiss-wa") are the 1984 amendments to RCRA that required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

Toxic Substances Control Act 1976
This act was designed to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the U.S. EPA screens these chemicals and can require testing of those that may pose an environmental or human-health hazard. It also tracks the thousands of new chemicals produced every year.

Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) 1980
This law created a tax on the chemical and petroleum industries to allow Federal authority to respond to releases of hazardous substances that may endanger public health or the environment. Over five years, $1.6 billion was collected into a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites.

Emergency Planning and Community Right-to-Know Act 1986
EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

Oil Pollution Act 1990
OPA strengthened EPA's ability to prevent and respond to catastrophic oil spills. A trust fund financed by a tax on oil is available to clean up spills when the responsible party is incapable or unwilling to do so. The OPA requires oil storage facilities and vessels to develop plans for what to do if there was a spill.

Pollution Prevention Act 1990
The Pollution Prevention Act focused industry, government, and public attention on reducing the amount of pollution through cost-effective changes in production, operation, and raw materials use. Opportunities for source reduction are often not realized because of existing regulations, and the industrial resources required for compliance, focus on treatment and disposal. **Source reduction** is different and more desirable than waste management or pollution control because it gets to the root of the problem.

Pollution prevention also includes other practices that increase efficiency in the use of energy, water or other natural resources, and protect our resource base through conservation. Practices include recycling, source reduction, and sustainable agriculture.

Interesting Websites to Learn More

Visit PA CleanWays, Inc., at www.pacleanways.org

General Recycling Processes
www.uoregon.edu/~recycle/after_collection.html

www.mde.state.md.us/Programs/LandPrograms/Recycling/Education/process.asp

www.sustainability.vic.gov.au/resources/documents/Info_5_-_Paper.doc (from Australia)

Glass
www.newtonsapple.tv/TeacherGuide.php?id=1047

www.gpi.org

Steel
www.recycle-steel.org/index.html

Tires/Rubber
www.dnr.state.oh.us

Plastic
www.calibre.co.nz/plastics.htm

www.plasticsresource.com

www.recycline.com

www.napcor.com

www.plasticsindustry.org/outreach/school/enviroplans.htm

Aluminum Cans
www.cancentral.com

Newspaper/Paper
www.gp.com go to: education in nature

www.afandpa.org

Re-Use Options
www.redo.org

www.constructionjunction.org

Waste to Energy (Incinerators)
www.wte.org

www.ocrra.org/about_overview.asp

Composting
www.howstuffworks.com/landfill/composting.htm

www.earth911.org/master.asp?s=lib&a=organics/organics.asp

www.pacompost.org/

www.compostingcouncil.org/

www.dep.state.pa.us Search: Composting

Recycled Crafts
www.kidsdomain.com/craft/irec.html

www.handcraftersvillage.com/recycled.htm

Topo and Geological
www.dcnr.state.pa.us/topogeo/places.aspx

"The Geology of Pennsylvania" to purchase a copy, contact the State Bookstore, Commonwealth Keystone Building, 400 North Street, Harrisburg, PA 17120-0053 or (717) 787-5109

Watersheds
www.epa.gov/adopt

www.wgby.org/edu/crei/pages/watershedcurriculum.pdf

www.bayeducation.net/lessons.html

www.pennsylvaniawatersheds.org

Pennsylvania Laws
www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/FACTS/Act101.htm

www.pacode.com

Enforcement Agencies
www.psp.state.pa.us

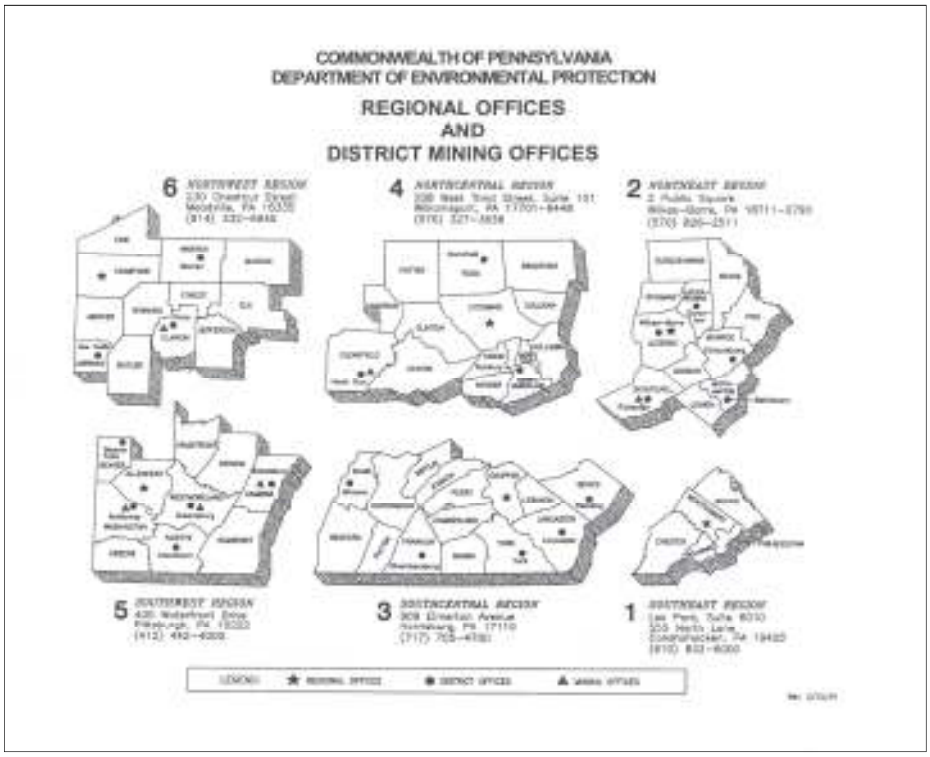
www.dcnr.state.pa.us

www.fish.state.pa.us

www.pgc.state.pa.us

www.dep.state.pa.us

Environmental Info
www.epa.gov



DEPARTMENT OF ENVIRONMENTAL PROTECTION—REGIONAL OFFICES

When you reach the regional office, ask to speak with the person who schedules education programs for schools. It is usually the education specialist or community relations person.

SOUTHEAST REGIONAL OFFICE, CONSHOHOCKEN *Bucks, Chester, Delaware, Montgomery & Philadelphia counties*	(570) 826-2511 Comm. Rel. (570) 826-5493 Education
NORTHEAST REGIONAL OFFICE, WILKES-BARRE *Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne & Wyoming counties*	(570) 826-2511 Comm. Rel. (570) 826-5493 Education
SOUTH CENTRAL REGIONAL OFFICE, HARRISBURG *Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry & York counties*	(717) 705-4931 Comm. Rel. (717) 705-4706 Education
NORTH CENTRAL REGIONAL OFFICE, WILLIAMSPORT *Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga & Union counties*	(570) 327-3659 Comm. Rel. (570) 327-3653 Education
SOUTHWEST REGIONAL OFFICE, PITTSBURGH *Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington & Westmoreland counties*	(412) 442-4182 Comm. Rel.
NORTHWEST REGIONAL OFFICE, MEADVILLE *Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango & Warren counties*	(814) 332-6816 Comm. Rel. (814) 332-6848 Education

Resources

Pennsylvania Resources

GreenWorks.TV is a monthly television program produced by The Environmental Fund for Pennsylvania. It showcases individuals, communities, businesses and government bodies that are taking innovative, positive steps to help preserve and protect the environment in PA. You can view highlights of current and past shows on their website **www.greentreks.org.**

Lake Erie/Allegheny Earth Force is part of a national, youth-driven, nonprofit educational organization headquartered in Alexandria, VA, with six regional offices across the country. Using their Community Action and Problem Solving (CAPS) protocol, local youth provide long-lasting solutions to environmental problems they have identified in their own communities. Their web site **www.earthforce.org** lets you find out what community change students are currently working on. Their regional site at 6270 East Lake Road in Erie offers training and technical assistance for teachers in Western Pennsylvania. Their phone in Erie is (814) 899-2572 and in Pittsburgh (412) 321-5434. Email address for the Pittsburgh office is earthforce.wr@verizon.net.

Pennsylvania Center for Environmental Education (PCEE) is an environmental education clearing house for the state of Pennsylvania. They have a directory of environmental organizations, an events calendar, and a job listing among other offerings. They can be reached at **www.pcee.org.**

PA CleanWays is a non-profit organization in Pennsylvania that fights littering and illegal dumping. Their comprehensive approach includes the following: organizing community cleanups of littered roads and illegal dumpsites; providing alternatives for hard-to-dispose items such as tires, appliances, batteries and HHW (household hazardous waste); education (school programs and educational materials); and beautification opportunities. They also have a local adoption program for roads, trails, waterways, blocks and parks. Reach them at (724) 836-4121 or at their website **www.pacleanways.org**.

The **Pennsylvania Alliance for Environmental Education**, a nonprofit organization promoting and supporting environmental education activities throughout Pennsylvania, has its website at **www.paee.net**. Their mailing address is: c/o Schuylkill Conservation District, 1206 AG Center Drive, Pottsville, PA 17901.

The **Pennsylvania Department of Conservation and Natural Resources (DCNR**) educational programs, interpretive programs, and teachers' workshops in state parks are outlined at **www.dcnr.state.pa.us/education**. The Department of Conservation and Natural Resources maintains the largest conservation and environmental stewardship education program in the commonwealth. Through a variety of educational and informational programs from one corner of the commonwealth to the other, DCNR staff annually educate hundreds of thousands of students, teachers and visitors to Pennsylvania's state parks and forests.

The **Pennsylvania Department of Education** website www.pde.state.pa.us/. Patricia Vathis is the director of the Office of Environment and Ecology and can be reached by writing, Department of Education, 333 Market St., Harristown 2, Harrisburg, PA 17108-1167; or by phoning (717) 783-6994.

Pennsylvania Department of Environmental Protection (DEP) has a website especially for educators at **www.dep.state.pa.us**. There are a variety of links to other Pennsylvania resources, as well as recycling lesson plans and a section on using computers in environmental education. The department's Environmental Education and Information Center, located on the first floor of the Rachel Carson State Office Building in Harrisburg, is open from 7:30 a.m. to 4 p.m. daily.

Pennsylvania Department of Transportation (PennDOT) — Each state has a Department of Transportation that offers transportation programs and services to its citizens. Pennsylvania's offers an adopt-a-highway program, a beautification program, and an adopt and beautify program in which community groups and youth can get involved. You can access them through their website at **www.dot.state.pa.us.**

The **Pennsylvania Environmental Education Grants Program** is described at **www.dep.state.pa.us/grantscenter/GrantAndLoanPrograms.asp**. For more information, phone Helen Olena at (717) 772-1828. Grants of up to $10,000 are available annually to schools, teachers, and non-profits administering approved environmental programs.

The **Pennsylvania Organization for Watersheds and Rivers (POWR)** is dedicated to the protection, sound management, and enhancement of the Commonwealth's rivers and watersheds and to the empowerment of local organizations with the same commitment. Log onto **www.pawatersheds.org** to find out what watershed organizations are in your area, order a watershed map or join a River Sojourn. Sojourns are educational, multi-day canoeing and float trips along many of Pennsylvania's waterways.

Find out more about the Litterbug at the **Pennsylvania Resources Council** website at **www.prc.org**. PRC was founded in 1939 as a nonprofit citizens group and serves as a link between industry, government and grassroots organizations seeking solutions to environmental issues. They provide information on waste reduction and recycling and work to protect our scenic beauty by fighting litter and visual pollution.

Planet PA.org is a green website for kids developed by the **Environmental Fund for PA**. Learn what's "hot" news, find out about recycling, play games, watch videos and order free stuff. There's even a section for teachers! Log on at **www.greenworks.tv/kids/index.htm**

National Resources

Antioch New England Institute is a great source to receive information on many environmental topics that have great concern. Call them at (603) 355-3251 or explore their website at **www.antiochne.edu**. Look under resources for teachers to get information on books, curriculum, environmental clubs, games and other website connections. The AskERIC connection can help both teachers and students with any questions they may have.

The **Container Recycling Institute** has lots of current info on who is recycling what. They have great links to other sites, and because they are an advocacy group, let you know what current issues they are working on and how you can get involved. Call them at (703) 276-9800 or log on at **www.container-recycling.org**.

Earth's 911 is a public and private partnership for the environment. Their mission is to empower the public with specific resources in their community to improve the quality of life. Reach them at 1-800-CLEANUP or at their website, **www.earth911.org,** to locate information about your community. They also have a kids' section.

The **Environmental Defense Fund** is an established green organization with a global environmental focus. Features news, alerts and guides for green living. Log on at **www.environmentaldefense.org** for information on recycling and pre-cycling. Visit the **Environmental Defense Fund's Action Center to take action on critical issues and send e-mails to top decision makers.** Log on at **www.environmentaldefense.org/actioncenter.cfm.**

The Environmental Health Clearinghouse has information available to the public on air pollution and health, toxic air and the effects of pollution on children, everything you ever wanted to know about the problems of the environment. For more information and free brochures call Environmental Health at 215-569-2300 or explore their website at **www.infoventures.com**.

Envirolink, a comprehensive resource for individuals, organizations, and businesses working for social and environmental change, can be found at **www.envirolink.org**. It includes educational resources, links to government resources and organizations, and grant writing assistance.

E: The Environmental Magazine, the only independent, environmental magazine in the U.S., has great information on some of the hottest environmental issues like air pollution, health problems, air quality, and consumer products. For more information on how you can subscribe to learn about these issues and receive information call 203-854-5559 or explore their website at **www.emagazine.com.**

The **Environmental Protection Agency** has information related to all types of environmental problems from clean air to hazardous waste. Search their website at **www.epa.gov** and go to their kids pages where you can explore a wide range of environmental topics including waste and recycling, what's happening in your neighborhood, watershed and state, and environmental club projects. You can also find **detailed info on each region** with local contacts and relevant websites.

Green Teacher is a publication chuck-full of information on environmental concerns, ideas for teachers to implement, as well as actual examples of EE teachers in action. The resource is loaded with green info and websites. Find out more about them at **www.greenteacher.com**.

Keep America Beautiful is a national program which provides individuals and communities strategies on preventing litter and illegal dumping. They offer tips, facts and information on what you and your group can do to make a difference. Check them out at **www.kab.org.** Additionally, there is a website for the City of Toledo, Ohio, which offers their program and strategies at **www.cityoftoledo.org.** It is a wonderful example of how a community has made practical solid waste information available to its citizens, both children and adults. It includes information on street and road adoption programs, composting, fall leaf collection, household hazardous waste collections, award, and upcoming events.

Iron Eyes Cody is the Native American actor who, starting in 1971, starred in a series of now-famous Keep America Beautiful public service ads. His face and famous "tear," as pictured in KAB's public service announcements, are credited with awakening the environmental consciousness of an entire generation of Americans to the problems posed by litter and other forms of environmental pollution. Iron Eyes Cody died on January 4, 1999, but his legacy will live on.

The **University of San Diego** has a website with a great papermaking link. Log onto **http://gort.ucsd.edu/preseduc/papermak.htm** and learn how to make paper at home or school with basic materials.

The **National Center for Environmental Decision-making Research** is a very helpful site with a very long name. It is designed to guide those wanting to make good, responsible decisions about a whole variety of environmental issues through the entire process. It helps you to identify the objectives you want to achieve and the things you need to consider to accomplish that goal. You can log onto their website at **www.ncedr.org/guides/litter**.

The purpose of the **National Resources Defense Council** is to safeguard the Earth: its people, its plants and animals and the natural systems on which all life depends. Their website **www.nrdc.org** gives you information on the many environmental topics they research and defend from negative legislation and action. There's a great link to Rachel Carson and her book **Silent Spring** at **www.nrdc.org/health/pesticides/hcarson.asp**. In 1962, she carefully described how the pesticide DDT entered the food chain and accumulated in the fatty tissues of animals and human beings and caused cancer and genetic damage. There's also a kids section on their home page entitled The Green Squad where you can learn how to do an assessment of you school and take steps to make it a greener, healthier environment.

The **Rotten Truth About Garbage** "takes an in-depth look at the complex issues surrounding solid waste. This on-line exhibition is organized into four major sections: Garbage?, There's No "Away", Nature Recycles, and Making Choices." Log on at **http://www.astc.org/exhibitions/rotten/rthome.htm**.

Scorecard is an environmental information service provided by The Environmental Defense Fund. Enter your zip code to find out what pollutants are released into your community and who is responsible. **www.scorecard.org**

The **Sierra Club** is devoted to protection of the earth's ecosystem and natural environment. To find information on the latest environmental topics like pollution, call (415) 977-5500 or explore their website at **www.sierraclub.org**. Click on search and enter the topic you want information on. The Sierra Club also has a list of activist guides, and picture books to read and help you better understand the importance of the environment. Note: **www.sierraclub.org/pa/** takes you to their Pennsylvania site.

PRINT RESOURCES

Waste and Want—A Social History of Trash
Susan Strasser
Metropolitan Books, Henry Holt and Company, New York 1999
This provides wonderful background material on the needs of people and the availability of goods and services for them.

Recycling in America second edition
Debra L. Strong
ABC-CLIO, Inc., Santa Barbara, CA 1997
This book is one in the Contemporary World Issues series and addresses vital issues in today's society. It provides a good starting point for research and contains an overview of the subject; a detailed chronology; biographical sketches; facts and data and/or documents and other primary-source material; a directory of organizations and agencies; annotated lists of print and nonprint resources; a glossary; and an index.

Rubbish! The Archaeology of Garbage
William Rathje and Cullen Murphy
Harper Collins Publishers 1992
William Rathje is the premier archaeologist of modern day garbage. His findings and observations are fascinating and can teach us a lot about ourselves.

Community Investigation

Where Does My Trash Go?

1. Does my community have mandated (required by law) waste pickup? Yes ☐ No ☐

2. Who are the waste haulers in my community? *(Use chart below and include addresses and phone numbers; you might need them later.)*

   Indicate whether they are:
   Local haulers,
   Municipal employees *(work for the municipality),* or are they part of a large
   National (or regional) waste hauler.

Do they offer curbside recycling as part of their services?

Identify Waste Haulers

Name	Address	Phone	L, M or N	Recycle? Y or N
•				
•				
•				
•				
•				

3. Is my community mandated to have a recycling program? Yes ☐ No ☐

4. Does my county have a designated recycling coordinator? (*Name, address, telephone #.)*

_____

_____

_____

Community Investigation: Continued

5. What does my community collect for recycling? (i.e., *Paper, glass, plastic, aluminum and steel cans, newspaper, magazines. Municipalities are usually only mandated to recycle three items; some recycle more.)*

_____

_____

6. Is there a permanent drop off recycling location and/or annual one-day community collection of hard to recycle items at various locations throughout the community?
(Appliances, batteries, Christmas trees, bulky waste, tires, electronics, etc.)

_____

_____

7. Where does the hauler take the recycled items? Where are they sent from there?

 plastic _____

 glass _____

 aluminum _____

 steel cans _____

 paper _____

 corrugated cardboard _____

 appliances _____

 batteries _____

 tires _____

 Christmas trees _____

 leaves/yard waste _____

Community Investigation: Continued

8. Do the recycled items generate money? Does it cover the recycling costs?

9. Does my community collect leaves and/or other organic material and compost them?

Yes ☐ No ☐

10. Find out where the trash goes after it is picked up:

- Does it first go to a transfer station?
- To which landfill(s) or waste-to-energy plants?
- The cost per ton?
- What they take and don't take. (*tires, metal, paint, leaves, brush, construction waste, household hazardous waste, computers, etc.)*

Transfer Station, Landfill or Waste-to-Energy Plant	Cost per ton	Exceptions (Items they do not take)

11. If your county has a waste-to-energy plant, where does the burned ash go? Are there any special regulations about handling it?

12. How does my community handle the items that are NOT accepted by the landfill or waste-to-energy plant? Any special collections?

13. How many years of landfill space are remaining at landfills used by my county? How has the county planned for additional capacity after that time?

14. If your county has a local solid waste authority, find out who serves on it, when they meet, and the issues they are working on. Attend some meetings and ask your county recycling coordinator or solid waste coordinator how your county plans for solid waste disposal and recycling.

15. Research which businesses, industry, government agencies and colleges in your community recycle and what they recycle.

Community Investigation: Continued

16. Public schools must recycle if they are in a community. But not all of them do. Find out if YOUR school recycles paper, aluminum cans, or plastic. If your school doesn't recycle, see what you can do to help start a recycling project for even one item.

17. Find out what other organizations (non-profit, youth, watershed groups, environmental, business clubs, etc.) have special collections, support recycling or help communities manage waste.

Suggestions for Youth Actions to Help Fight Littering and Illegal Dumping

The type of project chosen to help fight littering and illegal dumping in your community will depend upon the following: whether you have a specific site to focus on; whether the area you want to focus on is public, private or school property; or whether you are trying to affect public policy, private policy or community practice.

Develop Education Tools to Help Change Behavior
Once you decide on the particular issue you want to focus on, create some educational tools designed to educate people and change their behavior. Decide on a target group. Research what programs and/or materials are available in your community, review them and decide whether they are effective. Interview several local government, school and environmental group administrators, to learn what the history and current situation is. Brochures, public service announcements (radio), videos, "What You Can Do" tips, a puppet show or play, or posters are things to consider. Decide on how you will share and distribute these tools.

Use These Educational Tools to Teach Others
Take what you have produced and "go on the road." Share what you have learned and created with younger/older students, kids in other schools, civic groups, or at local fairs and community gatherings.

Evaluate Your School's Use of the Three R's
Does your school have a plan for dealing with litter and encouraging recycling? If you feel that your school is not living up to its environmental potential, conduct an environmental audit of your school's purchase, use and disposal of products. How often does it Reduce, Reuse or Recycle? Interview staff, administrators, cafeteria workers and custodians in your school or district. Use an interview questionnaire that you have designed with the input of your local recycling coordinator, PA CleanWays staff, environmental ed teacher or others you think would have good suggestions. After reviewing the results of your interviews, present a list of recommendations to your school administrators or school board, with lots of documentation and potential cost savings to the school district.

Produce and Facilitate a Forum on Littering and Illegal Dumping
Another educational tool you could produce is a School or Community Forum on littering and illegal dumping. Interview and invite stakeholders in your school and/or community (homeowners, kids, farmers, business owners, police, elected officials) to share their concerns, issues and how this problem impacts them. It can be very powerful for people to hear these people talk and have an opportunity to ask questions. Don't however, stop on a negative note. Give everyone an opportunity to discuss or brainstorm what they are going to do to make a difference. Discuss ideas beforehand and have several projects available, such as helping to organize an illegal dump cleanup, adopting their road, creating a strategy to decrease litter after ball games, etc., for everyone to sign up for.

Organize a Cleanup and/or Adoption of an Area
After deciding on an area or areas (school grounds, playing fields, neighborhood around school, park, or other place you care about) work with your local municipality, PennDOT, PA CleanWays, Keep America Beautiful group, watershed association, or environmental group to organize a cleanup. Focus on safety and always follow suggested guidelines. You will need parent and school permission for a project like this. Before the cleanup, decide on a strategy to keep the area clean. Discuss deterrents, education and enforcement, and, if possible, implement strategy for change before the cleanup.

Conduct a School, Neighborhood or Town Litter or Illegal Dump Survey
One of the most valuable tools that a group can have to effectively deal with the litter/illegal dumping issue is the information collected from conducting a town litter or illegal dump survey. This survey provides important baseline data about the scope of the problem (how big the problem really is). Use a map (you may have to make one) of your school, neighborhood or town to record the results of the survey. Mark heavily littered areas or illegal dumps with colored pins. Include any water sources: streams and rivers, as well as residential wells and city water supplies. Conduct an "attitudinal survey" treating all responses anonymously —you could just survey teens or the whole population. Visit a water treatment facility and talk to workers about what is filtered out of storm drains and water sources.

Publish a report and share this knowledge with others at a press conference and invite environmental groups, municipal and school officials and any other stake holders. Make take-home copies of the map to those you invite. Once people are aware of the scope of the problem, then they can plan a strategy to deal with it. A baseline survey will let them know whether any action they take is having an effect.

Enter a Contest
Find out if your state Department of Environmental Protection or other environmental group has any contests available for youth. Students from a high school in Tioga County, Pennsylvania, submitted the winning entry in a video public service announcement (PSA) contest, on littering sponsored by the Pennsylvania Department of Environmental Protection. "The department is recognizing and showcasing outstanding, student-produced work in video production through its sponsorship of the 'Eye on the Environment' litter prevention PSA contest," James Seif, DEP Secretary said. "The objective of the DEP initiative was to encourage students and teachers in schools statewide to work cooperatively in addressing issues related to the cause and effect of littering."

The winning group was invited to have their Grand Prize PSA entry professionally produced at the studios of JPL Productions in Dauphin County. The winning entries also can be seen on-line through DEP's website (direct link: recycling).

Plan a "Trash Festival"
After doing research on the "state of trash" in your school, neighborhood or town, plan a Trash Festival. Contact Vermont Institute of Natural Science, PO Box 86, Woodstock, VT 05091, (802) 457-2779 and ask for Waste Away, their environmental education curriculum on solid waste. It has wonderful ideas on how to have fun and educate others at the same time. Check out their website at www.vinsweb.org.

Create a Web Page
Using the information that you have gathered, create a school web page loaded with littering/illegal dumping info, "Reduce, Reuse Recycle" info for students, teachers and their families. (Or work with your local county or municipal recycling coordinator to have current information available on their website).

Be a Reporter
After any of the above projects, write articles for your local newspaper. Getting good media coverage is an essential piece of your educational package. Good photos, accurate quotes and in-depth articles with a human interest flavor will be the most readily accepted.

In-Depth Interview
If a particular aspect of the littering/ illegal dumping issue is of special interest, ex. "How Littering Impacts Farmers", create a series of questions to take to several farmers in your area. Call ahead and set up a time that is convenient for them, and be ready with your tape recorder and pencil to take down stories and anecdotes. Be sure to take your camera for any photo opportunities.

Research History of Waste Disposal in Your Community

- Research the location(s) of old town dump(s).
- Find out when it was closed.
- Learn how it was closed.
- Is or was there any monitoring of pollution?
- When did curbside garbage pickup and/or recycling begin in your community?
- Find out which current municipal haulers operate in your community.
- Are the haulers independent, municipal or part of a large waste conglomerate?
- Research what industries existed, what kinds of waste did they produce, how did they handle it?
- Where and how any industrial waste was disposed, etc.

Research Current Waste Disposal Practices in Your Community

- Find out what local and state solid waste disposal laws apply to your community.
- Find out how well these laws are enforced—who enforces them?
- Research the choices people in your community have to deal with their trash.
- Does everyone follow the rules?
- Find out where the trash goes after it is picked up.
- If sent to a landfill, find out how many years of landfill space is remaining.
- Find out what the recycling opportunities are.
- Where do the recycling items go—where do they go from there? Do the recycled items generate money?
- Research which businesses, industry, government agencies and schools recycle.

Propose Change to Your Community

After reviewing the littering/illegal dumping situation in your community, research recycling and disposal options, and current ordinances, penalties and enforcement procedures. Compare those with what is being done in other communities or information you research on the Internet. If you feel there are changes that could be made leading to a decrease in the problem, take a well researched proposal to your community leaders. A few ideas are:

- Local road or block adoption program (more information available from PA CleanWays)
- Campaigns to increase public awareness of problem
- Community collections for hard-to-dispose and hard-to-recycle items such as tires, appliances and Christmas trees
- Household hazardous waste education or collection program
- Community watches to strength the existing enforcement program
- Local hot line for reporting litterbugs
- Community pet waste cleanup ordinance

Examples of Youth Actions to Impact Littering and Illegal Dumping

Students Make a Litter Difference

This multi-year program was designed to increase individual and community awareness and responsibility for solid waste generation, as well as promote student/community interaction. Fifth grade students attended a three-day environmental education camp that focused on conservation, reuse, and recycling concepts. After the camp, they applied what they learned through hands-on activities including a community newspaper drive, an aluminum can recycling program in the school, and a cafeteria waste reduction effort. The students encouraged citizens to bring old newspapers to the school, advertised the event, and coordinated pickup and drop off times. In addition, they worked with cafeteria employees to purchase reusable products, rather than disposable ones. They also designed posters and wrote and performed plays encouraging community members and classmates to recycle. Their Alabama town now has less litter, and the students can understand and appreciate the positive impact of their efforts on the environment.

Waste Inventions—Students Build Landfill Solutions

Maryland middle school students met with their landfill manager who gave them a tour of the landfill, identified several problems at the site, and asked students to devise reasonable solutions. Each year, different groups worked on different challenges and designed and manufactured solutions using only materials they found at the landfill. One year, students designed and assembled a "wind-catcher," a contraption to catch loose paper and other debris from the landfill made of an old boat trailer, scrap lumber and used netting. Another group created a structure from wood braces and cross-strung nylon line to prevent seagulls, which scavenge at landfills, from destroying the office roof, saving the county more than $12,000 in repair costs.

Real World Recycling

At a time when few homes and businesses in their town were recycling, eighth grade students made recycling presentations to the school board and city council to lobby for community solid waste reduction. Over a two-year period, they performed waste audits of interested companies, examining trash, weighing recyclable materials and noting potential waste reduction applications. The students presented their findings, which included assessments of waste losses as well as current and potential costs and savings, to the companies. A town Earth Day event culminated the project, complete with booths designed and staffed by students, teachers and local government entities such as the Bureau of Land Management and the local fish and wildlife organization.

School Waste Prevention Tips

- Work with your cafeteria to eliminate waste. Switch to reusable cafeteria trays and plates and start a composting program for food scraps.
- Be willing to brainstorm ways that durable metal silverware doesn't get lost, because that is one of the primary reasons that cafeterias switched to disposable products in the first place.
- Encourage double sided use of copy paper.
- Find out what your school does with old desks, chairs and equipment. Have a year-end yard sale and use the $ for cleanup projects.

Through the project, students formed community connections and taught solid waste concepts, while business owners and employees offered insight on environmental concerns in the corporate world. (See Green Teacher, Issue 61, Spring 2000 for a sample school eco-audit—Measuring Your School's Ecological Footprint. Pg. 14-19.)

Future Homemakers Make a Difference

Recognizing a need for increased solid waste education in its school and community, the Future Homemakers of America club at a high school in Tennessee started a progressive solid waste education program in 1992 that continues today.

Students worked with a local company to design billboards with environmental messages such as "Help our Mother Earth" and "Earth Day Every Day." They also designed informational pamphlets, flyers and placemats to promote solid waste issues such as litter prevention, recycling, sorting and composting, for distribution at schools, grocery stores, and restaurants. Some students wrote articles for the local county paper about solid waste management issues, such as oil reuse. Others organized and used a curriculum with videos and activities to teach fellow students and those with special needs about solid waste management. Finally, the students made a solid waste management presentation to local civic organizations and practiced what they taught by adopting a two-mile stretch of highway, which they cleaned four times a year.

As a result of the program, solid waste awareness increased within the entire community, and students learned the importance of recycling and participating in the community. Several parents reported that after going through the program they got bins and started recycling at home.

From 4-H to 3 R's

Seventh and eighth grade students in a 4-H after-school program in Texas are teaching their peers and others in the community about the "three R's" - Reduce, Reuse, and Recycle - through workshops, a display, a video and a website.

Lights, Camera, . . .Recycling!

Recognizing that most solid waste educational materials are geared for a younger audience, students and teachers from two California high schools joined forces to produce their own educational video.

Students, teachers and volunteers from local media and educational organizations worked together to produce *100% Waste Free,* an education video with an important message designed to appeal to high school students. The students wrote the script and acted in a series of scenes that addressed purchasing and disposal behaviors. The video, combined with a follow-up discussion and suggested activities, has helped to generate an increase in student, faculty, and staff awareness for solid waste management issues. It also has become part of a presentation given to high school students and visitors to the local education center connected to one of the county's recycling facilities.

Storm Drains & Recycling Games

In Minnesota, a middle school science club and the Retired Senior Volunteer Program are working with young and old to teach waste management and proper disposal of hazardous materials in their community through an ongoing project. They stenciled storm drains with warnings to remind residents that dumping oil or other hazardous wastes is a serious threat to wildlife and water quality, produced flyers to further inform the community, and created recycling games for younger children.

Environmental Warriors Encourage Recycling

After hearing an inspiring speech about local environmental issues,

students in a Connecticut high school embarked on a year-long service learning mission. They improved their school's recycling program, implemented a new composting program, and assisted in redesigning the town's local recycling brochure.

To improve recycling at their school, the students partnered with mentally disabled peers to assess and redesign their current program, implementing changes and collecting a greater volume of recyclables. They also collected leaves from the community and newspapers and cafeteria scraps from the school for their composting program. Finally, they attempted to make the town's recycling brochure more attractive, in the hope that they could better educate local residents about which paper, metal, glass, and plastic items can be recycled.

Block Adoption

In a small town in Pennsylvania, a group of girls, ages 8-11, met weekly with a "grandmotherly" neighbor who encouraged them to keep their block free of trash and litter. After picking up the block around their homes regularly, they wanted others to know that they cared enough to adopt the area. Working with the PA CleanWays chapter in their area, they discovered that children younger than twelve years of age were excluded from all roadway cleanups because of safety concerns and that there had never been a residential block adopted.

They convinced PA CleanWays that they would follow all safety guidelines and be dependable in their pickup of the trash. PA CleanWays re-examined their policies and decided the low-volume, low-speed traffic on blocks in residential areas would be safe for children as young as eight years with proper supervision. The Frogedy Frog Girls Club now proudly shares their desire for a clean neighborhood with others who see the adoption signs and litter baskets to put trash in. These kids learned the value of "working with the system" and asking for what they needed. Kids can be powerful motivators of change if they do it in an organized, thoughtful and caring way.

Adopt Your School Grounds, Playing Field or Park

Keep America Beautiful and other local environmental groups such as PA CleanWays offers support to students wishing to keep the grounds they work and play on clean and looking cared for. They can guide you through the details of the cleanup process, including safety checks, parent permission slips, obtaining bags and safety vests. See Resources (page 70) to locate websites.

Waste Wise Accomplishments

Seattle University composted nearly 200 tons of food and yard waste, sold 4 tons of furniture and office supplies for reuse, and eliminated more than 2.5 tons of paper cup waste by distributing reusable mugs to students.

Glossary of Terms as Related to Solid Waste

Aluminum	A lightweight, non-rusting metal, commonly used to make soda cans, airplane bodies, and frames for lawn chairs.
Accidental Litter	Material that is deposited unintentionally, such as debris from accidents, material that falls from loaded vehicles or flies out of open bed vehicles. Includes items that spill from overloaded or tipped trash cans and items dropped or left behind by people.
Biodegradable	Able to be broken down by microorganisms and sunlight (photo degradable) into simpler forms.
Community	A group of people living in the same area or a group of people who have close ties and common interests.
Compost	A rich, soil-like mixture that is produced when organic materials, such as yard, garden and kitchen wastes, break down.
Conservation	The wise use of natural resources to minimize their loss and waste.
Commercial Waste	Solid waste coming from businesses such as stores, markets, office buildings, restaurants, shopping centers, and theaters.
Corrugated Cardboard	Cardboard made up of several layers, including a middle layer that is bent into a series of ridges and grooves with air spaces in between.
Decompose	The process of something breaking down. To rot.
Degrade	To break down into simpler forms.
Durable	Made to last a long time.
Deliberate Litter	Materials thrown down, discarded or left behind intentionally in inappropriate locations, including beverage, snack and other convenience food packaging.
Disposable	Meant to be thrown away after a single use or a few uses, rather than to be saved and reused many times.
Disposal	The act of throwing out or away. May happen in approved landfill, ocean dumping or incineration.
Drop Off	Method for collection of recyclable materials in a designated spot.
Dump (Illegal, Open or Flying Dump)	A site used to dispose of solid waste that does not have proper approval and permitting from solid waste regulatory agencies.
Ecological Impact	The effect that a human or nature caused action has on living organisms and their environment.
Ecosystem	A system made up of a community of living things together with their environment.

Enforcement	Actions taken to make sure that federal, state or local environmental laws are being followed. May result in corrective action, fines or criminal charges for violations.
Environmental Protection Agency	The agency of the U.S. federal government responsible for protecting human health and to safeguard the natural environment.
Essential	Necessary.
Garbage	Solid waste or trash—anything that we throw away.
Glass	A material made by melting silica. Used for making windows, containers, lenses, etc.
Groundwater	Water beneath the earth's surface that supplies wells and springs.
Hauler	Garbage collection company that offers complete refuse removal service; many will also collect recyclables.
Household Hazardous Waste	Hazardous products used and disposed of by residential rather than industrial consumers. Include paints, stains, pesticides, solvents and other materials containing chemicals that can catch fire, react or explode or that are corrosive or toxic.
Household Waste	Solid waste composed of garbage and rubbish which normally originates in a private home or apartment. It may contain a significant amount of toxic or hazardous waste.
Incinerator	A furnace or other unit used for burning.
Incineration	The process of burning waste products.
Industrialist	A person who owns or manages an industry.
Infectious Waste	Hazardous waste which can cause infections in humans. Includes contaminated animal waste, human blood, and blood products and discarded sharps (needles, scalpels and medical instruments).
Land Disposal of Waste	Involves hauling garbage to an area owned by a community or a private firm. Such areas range from unsanitary *open dumps* to properly operated *sanitary landfills*.
Landfill (also see sanitary landfill)	A place permitted by a solid waste regulatory agency where unwanted materials are deposited, compacted and covered with dirt.
Leachate	Water that percolates through a dump or landfill, picking up pollutants along the way.
Litter	Waste materials carelessly discarded or accidentally deposited in an inappropriate place. Littering is against the law.
Mandatory Recycling	Programs that legally require consumers to separate trash so that some or all recyclables are recycled rather than disposed.
Microorganisms	Tiny living things that can be seen through a microscope.
Municipal Solid Waste	Solid waste from homes. In some states, this includes waste from offices and stores. (The EPA has definitions and rules, states can further define and regulate solid waste.)

Natural Resources	Things in the world around you, such as trees, water, animals, soil and minerals, which are used to make products.
Non-point Source Pollution	Pollution without a single source or origin. Pollutants are generally carried off land by water. Farming, forestry, urban litter, mining, construction and city streets are among the causes. Litter is a non-point source pollutant.
Nutrients	Chemical ingredients in food that provide nourishment.
Office Paper	High grade papers such as copier paper, computer printouts and stationery. Usually generated in homes, schools, and businesses.
Oil	A substance made by prehistoric decay of organic matter, and currently used to produce many products, including fuels and plastics.
Packaging	Ways of wrapping products to protect them, advertise them, or make them convenient for sale.
Paper	A thin material made from pulp from wood, plants, old paper, or rags. It is used for writing, wrapping, and drawing. Specialty papers include those used in hospitals and for packaging.
Pest	An insect, rodent, fungus, weed or other form of land, water or plant life that is harmful to health or the environment.
Planned Obsolescence	A marketing concept developed to increase production and sales by creating products which must be replaced frequently (either because they have gone out of style or are designed to break easily or be disposed of).
Photo Degradation	The process of breaking down through exposure to sunlight.
Pollutant	Any substance that negatively affects the health of humans, animals, or ecosystems.
Pollution	In our environment, the condition of being dirty or impure, especially as a result of wastes.
Precycling	Reducing the amount of waste generated by avoiding disposables and over-packaged articles. Paper, glass, metals, and some plastics are commonly recycled items.
Product	Something made by working with raw or recycled materials. Usually sold.
Properties	Characteristics.
(RCRA) Resource Conservation & Recovery Act	This 1976 federal act gave EPA the authority to control hazardous waste from the “cradle-to-grave.” This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes.

Recyclable	Able to be used instead of raw materials to make a new product.
Recycle	To make materials such as glass, aluminum, paper, steel and plastic into new products.
Reduce	To decrease the amount of waste we produce by buying only what we need, avoiding disposables, and buying products that are not over-packaged.
Refuse	Trash, rubbish, anything thrown away.
Runoff	Rain, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving water.
Renewable Resources	Something we use from nature that can be replenished. For example, trees are a renewable resource; a tree can be planted to take the place of one that has been cut down. Oil is not a renewable resource; it takes million of years for oil to form.
Residual Waste	Nonhazardous industrial waste. It includes waste material (solid, liquid, or gas) produced by industrial, mining and agricultural operations. It excludes certain coal mining wastes and wastes from normal farming activities.
Reuse	To extend the life of an item by using it again, repairing it, or creating new uses for it.
Salvage	To save materials from destruction. When old houses are torn down, the lumber, bricks, trim boards, and fixtures can be salvaged and reused in other building projects.
Sanitary Landfill (also see landfill)	A place permitted by a solid waste regulatory agency where unwanted materials are deposited, compacted, and covered with dirt.Modern sanitary landfills also have systems for collecting and treating leachate, the polluted water that drains out from the landfill.
Solid Waste	The things we throw away: household trash, yard and kitchen wastes, old machinery and equipment, and many agricultural and industrial wastes.
Storm Sewer	A system of pipes that carries water runoff from buildings and land surfaces.
Surface Water	All water naturally open to the air (rivers, lakes, reservoirs, ponds, streams, and oceans.)
Toxic	Able to cause injury or illness through chemical or biological means.
Uninhabitable	Unable to support life.

Urban Runoff	Storm water from city streets and impermeable surfaces (such as parking lots) that carries pollutants into the sewer systems and receiving waters.
Waste Disposal	The process of getting rid of the waste material that people generate. People produce *gaseous waste*, such as carbon monoxide from cars; *liquid waste*, such as sewage; and *solid waste*. The many kinds of solid waste include paper and plastic products, bottles and cans, food scraps, and junked automobiles and appliances.
Wasteland	Desolate land, unable to support life.
Waste Reduction	The process of producing less waste. For example, people can reduce waste by minimizing what they use and by reusing and recycling items.
Watershed	The land that drains into a stream. The watershed for a major river may include a number of smaller watersheds that eventually combine.

Pennsylvania State Standards: Section One
Community Inventory

Standards listed are those most likely to be achieved in this segment.

Pennsylvania Academic Standards for Environment and Ecology (Grades 4, 7 — 2002)

4.1.7.B Explain factors that affect water quality and flow through a watershed
4.2.4.D Understand the waste stream
4.2.7.B Examine the renewability of resources
Identify renewable resources and describe their uses
4.2.7.D Identify materials that can be recycled in the community
4.2.7.D Explain the process of closing the loop in recycling
4.3.4.A Identify different areas where health can be affected by air, water or land pollution
4.3.4.B Identify how human actions affect environmental health
4.3.7.B Describe how human actions affect the health of the environment
Identify residential and industrial sources of pollution and their effects on environmental health
Explain the difference between point and nonpoint source pollution.
Explain how nonpoint source pollution can affect the water supply and air quality
4.6.7.C Explain a change in an ecosystem that relates to humans
4.7.7.C Identify natural or human impacts that cause habitat loss
4.8.4.C Explain how human activities may change the environment
4.8.7.C Describe what effect consumption and related generation of wastes have on the environment
Explain how a particular human activity has changed the local area over the years

Pennsylvania Academic Standards for Science and Technology (Grades 4, 7 — 2002)

3.1.7.A Explain the parts of a simple system and their relationship to each other
3.1.7.B Describe the use of models as an application of scientific or technological concepts.
3.2.7.A Explain and apply scientific and technological knowledge
3.2.7.B Apply process knowledge to make and interpret observations
3.2.7.C Identify and use the elements of scientific inquiry to solve problems
3.2.7.D Know and use the technological design process to solve problems
3.7.4.E Identify basic computer communications systems
Apply a web browser
Apply basic electronic mail functions
Use on-line searches to answer age appropriate questions

Pennsylvania Academic Standards for Reading, Writing, Speaking and Listening (Grades 5, 8 — 2002)

1.1.5.G Demonstrate after reading understanding and interpretation of both fiction and nonfiction text
1.2.5.A Read and understand essential content of informational texts and documents in all academic areas
1.4.5.B Write multi-paragraph informational pieces (e.g., essays, descriptions, letters, reports, instructions)
1.4.5.C Write persuasive pieces with a clearly stated position or opinion and supporting detail, citing sources when needed

Pennsylvania State Standards: Section One (con't)

1.5.5.A Write with a sharp, distinct focus identifying topic, task and audience.
1.5.5.B Write using well-developed content appropriate for the topic
1.6.5.A Listen to others
1.6.5.C Speak using skills appropriate to formal speech situations
1.6.5.D Contribute to discussions
1.6.5.E Participate in small and large group discussions and presentations
1.6.5.F Use media for learning purposes
1.8.5.A Select and refine a topic for research
1.8.5.B Locate information using appropriate sources and strategies
1.8.5.C Organize and present the main ideas from research

Pennsylvania State Standards: Section Two
Issue Selection

Standards listed are those most likely to be achieved in this segment.

Pennsylvania Academic Standards for Reading, Writing, Speaking and Listening (Grades 5, 8 — 2002)

1.6.5.A Listen to others
1.6.5.C Speak using skills appropriate to formal speech situations
1.6.5.D Contribute to discussions
1.6.5.E Participate in small and large group discussions and presentations

Pennsylvania State Standards: Section Three
Policy and Community Practice Research

Standards listed are those most likely to be achieved in this segment.

Pennsylvania Academic Standards for Environment and Ecology (Grades 4, 7—2002)

4.3.4.A Identify different areas where health can be affected by air, water or land pollution
Identify actions that can prevent or reduce waste pollution
4.3.4.B Identify how human action affect environmental health
Identify pollutants
Identify sources of pollution
Identify litter and its effect on the environment
Describe how people can reduce pollution
4.3.7.B Describe how human actions affect the health of the environment
Identify land use practices and their relation to environmental health
Identify residential and industrial sources of pollution and their effects on environmental health
Explain the difference between point and nonpoint source pollution
Explain how nonpoint source pollution can affect the water supply and air quality environmental

Pennsylvania State Standards: Section Three (con't)

4.9.4.A Identify local and state laws and regulations regarding the environment
Identify and describe the role of a local or state agency that deals with environmental laws and regulations.
4.9.7.A Identify and explain environmental laws and regulations
Explain the role of local and state agencies in enforcing environmental laws and regulations.

Pennsylvania State Standards: Section Four

What are your choices for making a difference with this issue?

Pennsylvania Academic Standards for Environment and Ecology (Grades 4, 7—2002)

4.3.4.A Identify different areas where health can be affected by air, water or land pollution
Identify actions that can prevent or reduce waste pollution
4.3.4.B Identify how human action affect environmental health
Identify pollutants
Identify sources of pollution
Identify litter and its effect on the environment
Describe how people can reduce pollution
4.3.7.B Describe how human actions affect the health of the environment
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PA CleanWays
Environment and Ecology Curriculum For Intermediate Students

Student Handbook

Environmental Laws

Recycling

Proper Disposal

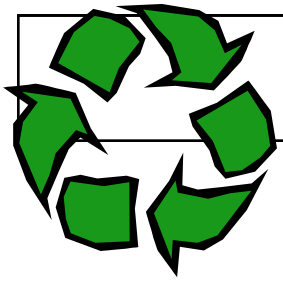
Composting

Illegal Dumping and Littering

Watersheds & Wetlands

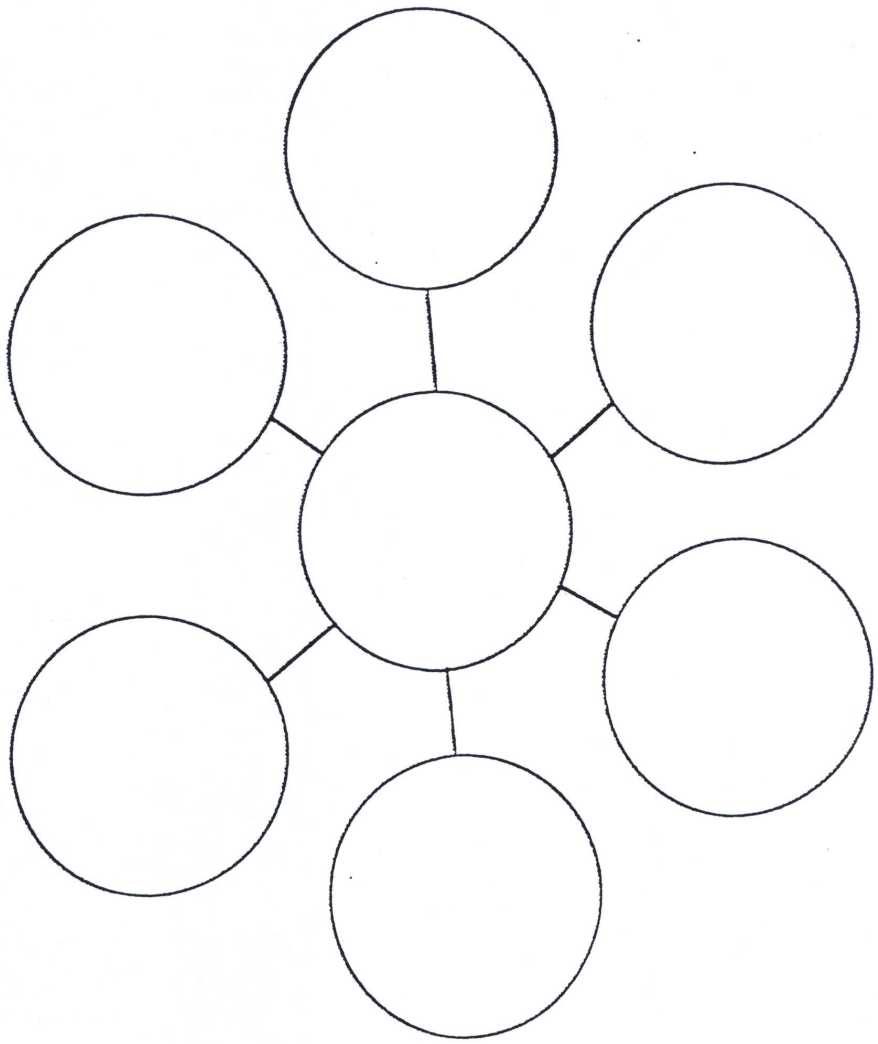
Renewable and Nonrenewable Resources

Visit our website at www.pacleanways.org



What is Recycling? Really…

Understand the role of recycling and waste management in your community! Conduct a community investigation and find out what happens to your trash after it's picked up.



Community Investigation

Community Questions

1. Does my community have mandated (required by law) waste pickup? Yes ☐ No ☐

2. Who are the waste haulers in my community? *(Use chart below and include addresses and phone numbers; you might need them later.)*

Indicate whether they are:
Local haulers,
Municipal employees *(work for the municipality),* or are they part of a large
National (or regional) waste hauler.

Do they offer curbside recycling as part of their services?

Identify Waste Haulers

Name	Address	Phone	L, M or N	Recycle? Y or N
•				
•				
•				
•				
•				

3. Is my community mandated to have a recycling program? Yes No

4. Does my county have a designated recycling coordinator? (*Who, name, ~~address~~, ~~telephone~~ #.)* ☐ ☐

Community Investigation: Continued

5. What does my community collect for recycling? (*Paper, glass, plastic, aluminum and steel cans, newspaper, magazines. Municipalities are usually only mandated to recycle three items, some recycle more.)*

_____

_____

6. Is there a permanent drop off recycling location and/or annual one-day community collections of hard to recycle items at various locations throughout the community? *(Appliances, batteries, Christmas trees, bulky waste, tires, electronics, etc.)*

_____

_____

7. Where does the hauler take the recycled items? Where are they sent from there?


plastic _____


glass _____


aluminum _____


steel cans _____


paper _____


corrugated _____


appliances _____


batteries _____


tires _____


Christmas trees _____


leaves/yard waste _____


_____

Community Investigation: Continued

8. Do the recycled items generate money? Does it cover the recycling costs?

9. Does my community collect leaves and/or other organic material and compost them?
Yes ☐ No ☐

10. Find out where the trash goes after it is picked up: To which landfill(s) or waste to energy plants, the cost per ton, and what they take and don't take, (*tires, metal, paint, leaves, brush, construction waste, HHW, computers, etc.)*

Landfill or Waste to Energy Plant	Cost per ton	Exception (Items they do not take)

11. If your county has a waste to energy plant, where does the burned ash go? Are there any special regulations about handling it?

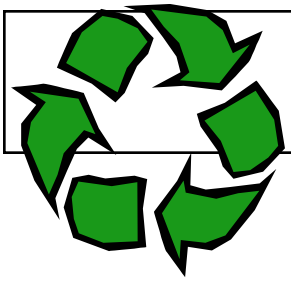
12. How does my community handle the items that are NOT accepted by the landfill or waste to energy plant? Any special collections?

13. How many years of landfill space are remaining at landfills used by my county? How has the county planned for additional capacity after that time?

13. ~~If your county has a local solid waste authority, find out who serves on it, when they meet,~~ and the issues they are working on. Attend some meetings and ask your county recycling coordinator or solid waste coordinator how your county plans for solid waste disposal and recycling.

14. Research which businesses, industry, government agencies and colleges in your community recycle.

15. Find out what other organizations (non-profit, youth, watershed groups, environmental, business clubs, etc.) have special collections, support recycling or help communities manage waste.



Recycling in My Community

Discover what items <u>can</u> be recycled in your community and what items <u>are</u> being recycled in your community.

Recycling in My Community

1. Use the information you gathered during your Community Investigation to discover HOW and WHEN your community has opportunities for hard-to-recycle items such as appliances, tires, mattresses, furniture, electronics, etc. How can community members find out about them, how much do they cost the community and how are they paid for?

2. Do research on the Internet to find out all you can about **recycling**. Then find ways to share this information with your family, fellow students, and community. Here are some questions to start with:

   A. What are 6 of the most commonly recycled items?

   B. List 1-4 things that can be made out of each one. Make a game for your family, friends or other students to match the recycled item with what it is made into.

   C. What is done to the discarded item (such as a plastic bottle) to recycle it into another item (such as a fleece jacket)? What are the steps of the process to get the bottle made into the jacket?

   D. Make a poster to illustrate 2-3 of the processes you learn about. Share it with others.

   E. List 6 things you can do to recycle waste.

   F. Think about newspapers. Make a list of all the things you can do to reduce using them, to reuse them and to recycle them. Illustrate this.

   G. When you are shopping, how can you tell if something is recycled?

   H. Why are recycled items sometimes more expensive than others?

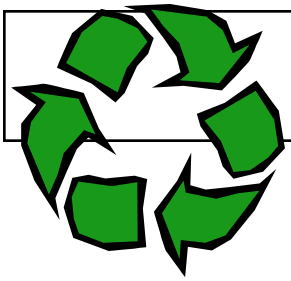
   I. What can we do to help the cost of these items go down?

   J. Choose one of the things you found most interesting and create a presentation with visuals to share with kids in a younger grade. Do it with a partner if that works better for you.

   K. Does your county have a recycling coordinator? (Sometimes another environmental organization serves in this job. In Westmoreland County, the local PA CleanWays chapter provides their residents with recycling opportunities.) Invite them to speak to your class or see if you can visit them and ask questions. Be sure to prepare questions before your meeting.

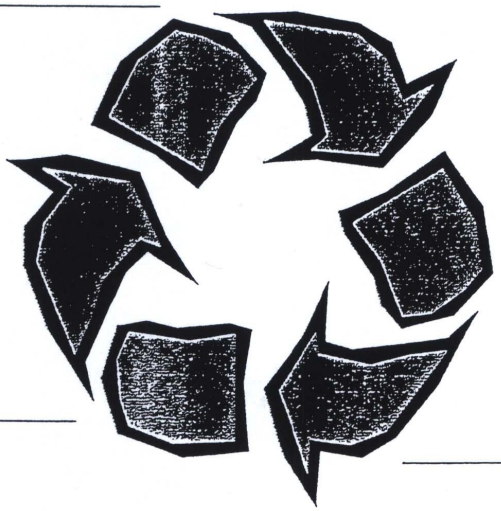
Earth 911 is great website that can help you find out what is happening with recycling in your community. Their website is **www.earth911.org** and they also have a kid's section.

Check out the Pennsylvania Recycled Products Manufacturers' list on the PA Dept. of Environmental Protection website at **www.dep.state.pa.us** by typing "buy recycled" into the keyword search and learn where you can get recycled products made in Pennsylvania. Visit one of the sites nearby, if possible.



Closing the Loop & the 3 R's

Investigate methods that can be used to reuse materials for new products and build an interactive game that will help explain what it means to close the loop.



What's the difference?

Closing the Loop & the 3 R's

1. Find out what the three chasing arrows of the recycling symbol stand for.

2. What does it mean to 'close the loop' in recycling?
   (Use the website resource guide)
   *Check out **www.dep.state.pa.us** (Keyword "Buy Recycled")*

3. List 6 things you can do to reduce waste.

4. List 6 things you can do to reuse waste.

5. List 3-5 things that can be done to recycle besides separating your bottles, cans and plastics for collection.

6. List 3-5 things you can do to help folks learn how to buy recycled items, including items that are made in Pennsylvania.

7. List 3-5 things you can do to reduce the number of newspapers you use.

8. How can you tell if something is **able to be** recycled or is **made out of** recycled materials?

Make An Electric Recycling Board

1. On a large piece of heavy cardboard or wallboard, draw or paste pictures of **trash that can be recycled (used)** on the left side of the board and **what that item can be recycled into (reused)** on the right side of the board.

2. Under each picture **make a small hole** (for the brass fasteners.) Also make holes at the top of the board (for the light bulb) and at the bottom left and right hand corners (for the extension cords).

3. **Insert a brass fastener** into each hole that is under the picture.

4. On the back of the chart, **connect the prongs** of the fasteners in pairs with a piece of extension cord split in half (wire exposed to wrap around fastener). **Cut the extension cord** to lengths needed to connect the old product (used) with the correct recycled product (reused).

5. At the top center of the front of the board, **attach a small light bulb** through the hole, screw in to socket and secure with electrical tape.

6. On the back of the board, use duct tape to **attach two batteries** to the board (positive end to negative end).

7. Next, take another piece of old extension cord cut in half, and with duct tape, **attach** one end of one piece of extension cord (with wire exposed) to the **right end** of the battery pairs. **Attach** one end of the other piece of extension cord (wire exposed) to the **left end** of the battery pairs (with wire exposed).

8. At the location of the light bulb, **expose the wire of the extension cord**. Make sure the wire touches the metal on the base of the light bulb. **Secure with electrical tape**, covering all exposed wire.

9. From the back of the board, **tape the excess of the 2 extension cords** around the edge of the chart and through holes at the bottom so they can attach to the rods on the front.

10. **Wrap the exposed wire end of each extension cord around the end of a brass rod or large brass fastener**. Secure with electrical tape, wrapping each rod with enough electrical tape to ensure a safe and comfortable grip. Leave the end of the brass rod exposed. When using the Electric Recycling Board, hold the brass rods by the ends covered in electrical tape. **DO NOT** touch the brass rods.

11. When one rod is touched to the brass fastener under the item to be recycled and the other to what it can be made into, the light bulb will turn on. Keep trying until you get the correct answer!

Make An Electric Recycling Board

Electronic Recycling Board

The recycled items below are suggestions. Customize your electronic board by researching other materials that can be recycled.

Soda cans (Aluminum).....Aluminum cans, window frames, rain gutters

Automobiles, cans, appliances (Steel).....Automobiles, toys, wire

Newspaper (newsprint).....Homosote, wallboard, animal bedding, kitty litter

Tires.....Running track, soaker hoses, crumb rubber, "mulch," flooring

Soda bottles (PET plastic).....Carpet, fleece material, insulation, shower curtains, fiberfill

Corrugated cardboard.....Cardboard

Milk jugs, laundry detergent bottles (HDPE plastic)....Decks, toys, "lumber"

Office paper.....Bathroom tissue, paper towels, packing material, fiberboard

Styrofoam cups, to-go containers (Polystyrene).....Rulers, pens, toys

Leaves, fruits & vegetables.....Compost

Composting… What Happens to Leaves, Grass, & Food Scraps?

Conduct experiments that will compare the decomposition rates of different organic materials and find out what's happening with composting in your community.

What happens to the leaves and yard waste in my community? Can food scraps be recycled?

1. Try this!
   - Half fill 6 paper cups with soil (Carefully dig up some soil under a tree or shrub that is likely to contain microorganisms.)
   - In each one place a different organic, biodegradable item, such as a piece of orange or banana peel, egg shells, scrap of cotton or wool fabric, apple core, grass, piece of a sandwich, coffee grounds, piece of newspaper or cardboard, or cracker.
   - Fill with remainder of soil. Put each cup on a piece of paper and label the cup and the paper.
   - Place on a windowsill or table and spray the container lightly with water until the soil is moist but not soggy.
   - Use a strip of paper to create a chart which will help you keep track or when you water and shake each cup, and also what each item looks like when you uncover it at the end of each week.
   - At the end of every day or so, spray the contents with water then put on a lid and shake the container to allow air and moisture to get between the soil particles and around the items.
   - Keep the lid on overnight to reduce evaporation, but remove it in the morning and leave the container open during the day.
   - At the end of one week poke into the soil with a plastic spoon and see what's happened to the items. Draw a little picture on each piece of paper illustrating what you see. Cover back up with soil.
   - Look again in two, three and four weeks and draw what you see.
   - Which items biodegraded (broke down) most quickly? Which took the longest? Why do you think this happened?

2. Many communities collect leaves and yard waste seasonally. Find out what they do with it. It becomes something useful over time and can save community parks and gardens money when they don't have to buy it. Learn about composting opportunities in your community. The Earth 911 website will help you **www.earth911.org**

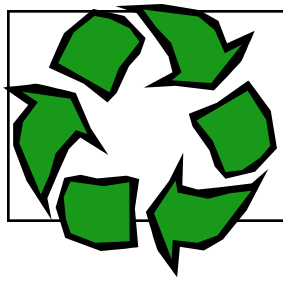
3. Work with your teacher to invite someone who knows a lot about composting into your classroom to demonstrate the process and to answer your questions. Brainstorm a list of questions ahead of time.

Observing Composting

Name: _____

Group: _____

Day	Date	Water	Air	Observations & Illustrations
1				
2				
3				
4				
5				
Week 2				
Week 3				



Disposable Products… What Do They Really Cost?

Investigate the real costs of disposable products and discover alternatives that produce less waste.

Disposable Products
What does all this cost my community?

1. Choose 5-8 items that you and your family use regularly and toss out when you are finished with them: paper plates, disposable razors, 6-packs of soft drinks, individual serving sized gelatin, fruit or pudding, paper cups, etc.

2. Make a chart that lists how much these items cost—then divide that by the number of items or servings in each package to figure out the individual cost.
   i.e. - a twelve pack of single serving pudding costs $4.59. Divide $4.59 by 12 to learn how much each serving costs— about $.38 each. However, there's a plastic cup and a foil lid that needs to be disposed of.

3. Now figure out how much it would cost to make a serving of pudding using a box of mix and milk.
   i.e. - Pudding mix (for 6 servings) costs $1.39. So $1.39 divided by 6 is $.23 for one serving. Milk costs $2.51 a gallon. There are 16 cups in a gallon and you only need 2 to make the pudding, so divide $2.51 by 16 to find out what 1 cup costs. Then multiply that by 2 because you need 2 cups. So milk costs about $.32. So one serving of homemade pudding costs about $.55 cents a serving. You'll need a reusable plastic container to put your pudding in and that can be used and reused for a long time.

4. Try this with another kid favorite—peaches. An 8 pack of diced peaches in 4 oz. cups is $4.00. Divide $4.00 by 8 and that means each serving costs $.50.

5. A 16 oz. can of sliced peaches costs $.99. There are 4 4 oz. servings in the can so if you divide $.99 by 4, each serving would cost about $.24. Again, you would need a reusable plastic container to carry them to school in.

4. Do this for your other items and see what the costs are!!

5. Now figure out how much waste there is with each option!! What can be recycled or reused and what goes into the trash! Put the figures in your chart and share with others. Whenever we make choices we have to weigh different things such as cost, waste, convenience and commitment to change.

6. Are there any changes you might make in your choices for buying or asking parents to purchase certain items?

Name: _____

Date: _____

Disposable Products...
What Do They Really Cost?

Disposable Item	Cost of Item	Serving Size	Individual Cost	Alternative Item	Cost	+/-
6-Pack Pudding				Pudding Mix		

What's in Your Trash?

Find out how much waste is generated in your classroom and think about ways you can help reduce it.

What's in Your Trash?

Classroom Waste Audit

1. Decide how you want to convey the results of your waste audit. Think about the most effective way to share your data—visually, orally, written report, etc.
2. What items did you find the most of? Where was this waste generated? Is this item recyclable?
3. What items did you find the most of? Where was this waste generated? Is this item recyclable?
4. What other items found in the audit can be recycled or reused?
5. How much of the weight comes from packaging materials? What are some reasons for this packaging? Can you think of some alternative to this kind of packaging?
6. How can you, personally, reduce the amount of waste at your school?
7. Implement your results by developing a flyer or posters that show what students can do to reduce their waste.
8. Develop strategies to change both student and teacher behavior to reduce waste.
9. Conduct additional waste audits monthly, quarterly, or twice a year to monitor the progress in the school's waste reduction.
10. If there is a reduction in waste hauling services, work with your school's administrators to develop a plan for using the money that is saved.

Waste Audit Statistics

Waste from:	Weight of empty garbage can	Weight Paper	Weight Aluminum Cans	Weight Glass	Weight Plastic	Weight Other Waste	Weight Wet Waste
All 5th grade classrooms							
All 6th grade classrooms							
All 7th grade classrooms							
Administrative Offices							
Cafeteria							
TOTAL WEIGHT (lbs)							

Use this form or create your own. You might choose to audit just one grade or selected classrooms.

Do the Right Thing… Recycle

Discover the benefits of recycling and develop a recycling program for your school.

Determining Your Success

1. Determine how you will know if you were successful. If you began this project by performing a waste audit, will you perform another one in 3 months? Six months?

2. Ask for tonnage or volume reports from the recycler/garbage hauler.

3. Quantify the success of your recycling program by determining the amount of resources saved, pollution prevented or dollars saved (or earned). Create a chart that will help others become aware of the benefits of recycling.

4. Keep track of student volunteer hours to show how much time and salary was saved. Present this information to the administration, student body and school board. For Independent Sector value of a volunteer's time go to **www.independentsector.org/programs/research/volunteer_time.html**.

5. Design a forum to discuss recommendations and ideas for improving or expanding the program with the students, teachers and staff. Did you have full cooperation of the student body and staff? If not, what incentives could encourage participation?

6. Has there been a change in attitude toward "throw away" behaviors? Do you think these changes are directly related to the school's recycling program? Explain.

7. How can the school further reduce the amount of waste that is thrown away?
    - Interview the cafeteria management. If "throw away" utensils and trays are used, ask them why. Ask them to support your recycling program by using items that can be reused.

8. Communicate your success. Give periodic updates on the recycling program in the school's newspaper or create a bulletin board.

9. Recognize the efforts of the staff, student body and local businesses. Remember to thank all those involved. If a local business donated containers for your program, write them a thank you note. Include a photo of the recycling program "in action."

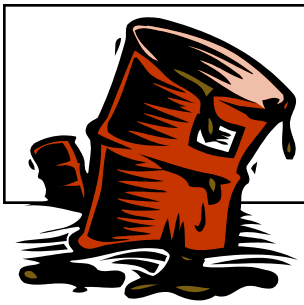
10. What have you learned from this project? What would you do differently next time? Did you encounter any obstacles?

Renewable and Nonrenewable Resources

Find out what materials and resources provide you with energy, food, housing, and water and learn the difference between renewable and nonrenewable resources.

		RESOURCES USED FOR		
PRODUCT	**RAW PRODUCTS USED TO PRODUCE**	**MANUFACTURING**	**PACKAGING**	**TRANSPORTATION**
orange juice	Oranges, water	Steel (equipment), Oil (to run equipment)	Glass, waxed cardboard, oil (for plastics)	Gas, steel, rubber, oil
milk				
shoes				
sweater				
bricks				
electricity				
gasoline				
bread				
baseball bat				
2 litter bottle				
bag of potato chips				
baseball				
car tires				
swimming pool				
light bulb				
house				
cd player				

MAP



Everything...Including the Kitchen Sink

Find out what illegal dumping is and how it affects the environment, animals, fish, birds and YOU.

Presentation of Problem to Local Officials

Share the illegal dumpsite visit:

- Remember to use visual aids (charts, graphs, photos) to show the problem.
- Discuss the contaminants found and their threat to the environment.
- Create a flyer or handout that folks can take with them as a reminder of the information presented.
- Let them know that you want to help solve the problem.
- Ask for and agree on an action step to ensure the issue does not become "dead in the water."

Consider asking your local officials these questions:

1. Who is responsible for waste disposal, recycling and waste prevention in our community?

2. What options do residents have for waste disposal?
   - Is there mandatory trash collection in our community and is it required by law that homeowners pay for trash collection?
   - Is trash collected by municipalities or private haulers?
   - Are recycled items picked up at residents homes? If not, are drop-off sites available and convenient to all residents?
   - Does the community operate or fund a composting facility for grass, leaves, food scraps and other types of organic materials?

3. What goals have been set for waste generation, disposal, recycling and waste prevention (state or municipal)?
   - What is used to measure the progress or success of these goals?

4. How does the community educate the public about waste disposal options and recycling opportunities?
   - Are there ad campaigns?
   - Does the community have a resource guide to help steer residents in the right direction?

5. Does the community encourage residents or businesses to reduce the amount of waste generated?

6. Who is responsible for the cleanup of illegal dumpsites?

Illegal Dump Survey

Date_____

Name_____ **Class**_____

Number of Students performing the survey_____

Others in attendance (include affiliation/agency)

_____ _____
_____ _____
_____ _____

Is the dumpsite located on public or private property? (circle one)

Location of dumpsite:

Road/Area name_____

County_____

Municipality (Borough, City, Township)_____

Location of road/General direction to the dump site (include landmarks)

_____
_____
_____

Terrain:
Describe the terrain. Is the garbage over a steep hill? Along the roadside? Near or in the water?_____
_____
_____

Contents of site: What kind of trash do you see? Estimate how much.

Daily household garbage_____ Yard Waste_____

Appliances_____ Tires_____

Beer bottles_____ Vehicle parts_____

Construction Debris_____ Other_____

Estimate the size of area the dumpsite covers (square feet)_____

Why do you think this location was chosen to illegal dump trash?

_____
_____
_____

Name_____ Date_____

Everything… Including the Kitchen Sink
(Illegal Dumping and Solid Waste Laws)

Illegal dumping almost always occurs in remote, isolated and abandoned areas. In rural areas, trash is often thrown over hillsides completely out of view of passing motorists. In urban areas, trash can be found in vacant lots, parks, and abandoned buildings. View the virtual tour and complete the Student Survey and questions below.

1. What would prevent you from littering or illegally dumping?

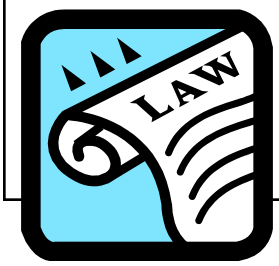
2. What is the problem with dumped tires?

3. What other problems are associated with illegal dumping?

4. How do you think dumping could be deterred or stopped?

Someone who gets caught littering or dumping trash will probably have to pay a fine. It may be as high as $300. Some agencies can even charge $10 for each piece of trash found. In some instances, a person who dumps trash could have his or her car taken from them, or have to clean up the entire dump, not just the trash they dumped.

Did this activity change the way you feel about protecting the environment? Explain.



Why are There Laws That Address Solid Waste?

Research some environmental laws and get to know the agencies that deal with disposing trash illegally.

You're the Boss

Your business, *My Own Remodeling and Landscaping Company* is finishing your first big job, building a second story addition and a garage. You had to remove some bushes and a tree, tear down an existing garage and bulldoze dirt and rock from the site. You wanted to burn the bushes, trees and wood from the garage, but the township doesn't permit open burning. Someone was going to use the bricks from the old garage, but they had paint on them and no one wanted them. Now that the job is finished, you need to remove these materials to finish landscaping the yard.

Bub, who works for another company, *Get It Built Quick*, suggested that you use the place he throws out his leftover materials. Bub gave you directions to the dump he uses. It is along a gravel road, on a rocky pull-off next to a swamp. Soil, rocks, wood and concrete block are already dumped here along with a lot of daily household trash, partially covering a "**NO DUMPING**" sign.

1. Should you use the dump that Bub recommended? Why or why not?

2. Since other people are dumping here already, is it OK for you to use this spot, too? Why or why not?

3. Why might this dump be a bad location?

4. OK, so you might not dump the construction debris but dumping the yard waste isn't really 'dumping' because it's natural and will biodegrade, right? Do you agree? Why or why not?

5. Can the plants be reused/composted/mulched/replanted? Can you take them to a landfill?

6. If you dump the construction waste here, and get caught, which agencies could cite you for illegal dumping?

7. If you get caught dumping here, what penalties do you face?

8. What are some things that you can do to get rid of the waste from this job legally? (See **www.constructionjunction.org**.)

9. WHO CAN YOU CALL TO REPORT AN ILLEGAL DUMP?

Bub is convinced that you should dump your supplies along the gravel road. No one has ever been caught and besides that, all of the local contractors use it. Explain why you agree or disagree with him using what you have learned so far.

As you write, be sure to:

- Give specific examples of the effects of dumping.
- Include your own ideas.
- Write neatly and clearly.
- Form well developed paragraphs.

Student Conducted Survey

Age group
Check one: ___ under 8 years old ___ 8-12 years ___ 13-16 years
___16-21 years ___21-35 years ___ 36-55 years
___56-65 years ___ over 65

1. Have you ever witnessed anyone littering? ___ Yes ___ No

2. Have you ever littered? ___ Yes ___ No

3. Is there litter or dumped trash near where you live, go to school, play, or work?___ Yes ___No

4. Have you ever seen an illegal dump site? ___ Yes ___ No

5. If you have seen an illegal dumpsite, how did it make you feel?
_____
_____

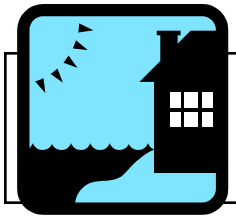
6. Do you think it's wrong to litter or dump your trash over a hillside?
___ Yes ___ No
Why or why not? _____
_____

7. Do you know it that littering and illegal dumping are against the law?
____Yes ___No

8. Would you litter if you knew you wouldn't get caught? ___ Yes ___ No
Why or why not?_____
_____
_____

9. Have you ever picked up someone else's trash? ___ Yes ___ No

10. Do you live in an urban or rural area? ___ Urban ___ Rural



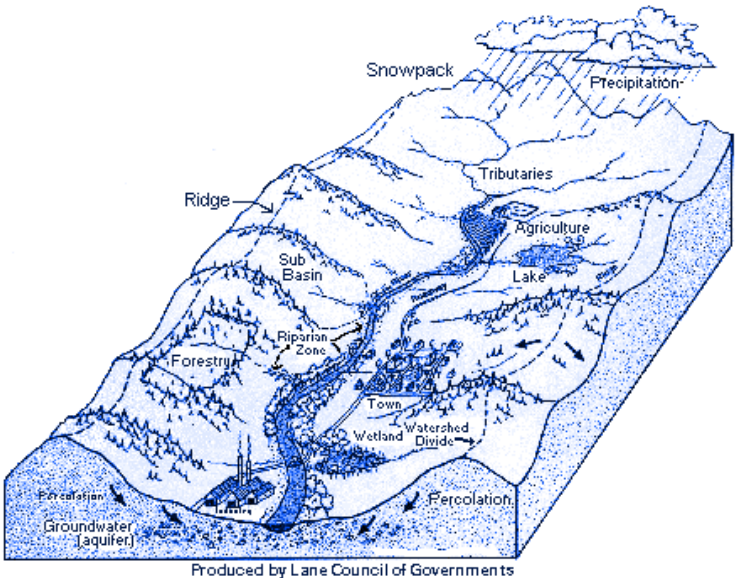
What's a Watershed?

Learn what a watershed is and how litter and illegal dumping can affect them. Then have fun building a model of a watershed that will demonstrate how water collects pollutants.

The Making of a Watershed

Any time water runs from one place to another it's called a watershed, and we all live in watershed areas. A watershed is a land area from which water drains into a receiving body of water. Receiving bodies of water can include streams, lakes, wetlands, estuaries and groundwater. Watersheds come in different shapes and sizes and local watersheds are subwatersheds (subbasins) of larger, regional ones. The Allegheny River, for example, is a subbasin of the larger Ohio Basin.

Usually, rainwater falls on the ground and soaks in when it rains. When people build neighborhoods, streets and buildings, the rain also falls on what we call "hard surfaces." Those are roofs, driveways, streets, parking lots and even hard compacted ground. The rainwater can't soak into these hard surfaces, so it runs off from the highest point to the lowest. Unlike pollution from factories and sewage plants, nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and even underground sources of drinking water.



NONPOINT SOURCE POLLUTION

- Fertilizers, herbicides and insecticides.
- Oil, grease and toxic chemicals from urban runoff.
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks.
- Dams and concrete channels.
- Salt from irrigation and acid drainage from abandoned mines.
- Bacteria and nutrients from livestock, pet waste and faulty septic systems.

How to Make a Watershed Model Project

Materials

Large Waterproof Tray or Tub
Food Coloring or water-based paint and brush. (Different colors will represent different elements in a watershed).
Spray bottle filled with water
Small pieces of crumbled scrap paper (to represent solid waste)
Coffee grounds (to represent soil and chemicals)
Foil- shaped to represent differing contours of the land. You can also use crumpled paper towels for this step.
Small pieces or strips of sponges (to signify wetlands)
Plant material (leaves, grass clippings, rhododendron leaves)
Small objects to resemble a town (monopoly pieces)

1. Work in groups or pairs. Create a model different from your neighbor to show effects that different land contours have on a watershed.
2. Use the large tray as a base for the various land formations.
3. Place foil mounds to signify mountains and this will also create outlines of a river in the valley.
4. Use plant material to resemble trees in the mountains and tape them to the plastic.
5. Use some other type of material to resemble agricultural crops and tape them to the plastic.
6. Use small objects to resemble a town.
7. Use sponges to represent wetlands.
8. Sprinkle coffee grounds over the watershed to signify soil particles.
9. Now use the water-based paint or food coloring to represent contaminants. Refer to the color key created by your class.
10. Finally, spray water over their watershed model to symbolize rain.
11. Explain what happened to the pollutants.

Name: _____

Date: _____

Building a Structure: Making a Watershed

Category	4	3	2	1
Model Care Taken	Great care taken in construction process so that the structure is neat, attractive, and follows plans accurately.	Construction was careful and accurate for the most part, but 1-2 details could have been refined for more attractive product.	Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.	Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.
Knowledge about real life situation	The student can answer 3 questions correctly about how the model relates to their watershed being studied.	The student can answer 2 questions correctly about how the model relates to their watershed being studied.	The student can answer 1 question correctly about how the model relates to their watershed being studied.	The student does not understand how the model relates to their watershed being studied.
Use of class time	Used time well during each class period. Focused on getting the project done. Never distracted others.	Used time well during each class period. Usually focused on getting the project done and never distracted others.	Used some of the time well during each class period. There was some focus on getting the project done but occasionally distracted others.	Did not use class time to focus on the project OR often distracted others.
Required elements	The model includes all required elements as well as additional information.	All required elements are included on the model.	All but 1 of the required elements is included on the model.	Several required elements were missing.
Working with others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause 'waves' in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team player.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Website Resources

Visit PA CleanWays, Inc., at www.pacleanways.org

General Recycling Processes
www.uoregon.edu/~recycle/after_collection.html

www.mde.state.md.us/Programs/LandPrograms/Recycling/Education/process.asp

www.sustainability.vic.gov.au/resources/documents/Info_5_-_Paper.doc (from Australia)

Glass
www.newtonsapple.tv/TeacherGuide.php?id=1047

www.gpi.org/recycling

Steel
www.recycle-steel.org/index.html
Also see their "Education" link

Tires/Rubber
www.dnr.state.oh.us/recycling/awareness/facts/tires

Plastic
www.calibre.co.nz/plastics.htm

www.plasticsresource.com

www.recycline.com/environment/process.html

www.napcor.com

www.plasticsindustry.org/outreach/school/enviroplans.htm

Aluminum Cans
www.cancentral.com

Newspaper/Paper
www.gp.com go to: education in nature

www.afandpa.org

Re-Use Options
www.redo.org

www.construction junction.org

Waste to Energy (Incinerators)
www.wte.org/education

www.ocrra.org/about_overview.asp

Composting
www.howstuffworks.com/landfill/composting.htm

www.earth911.org/master.asp?s=lib&a=organics/organics.asp

www.pacompost.org/

www.compostingcouncil.org/

www.dep.state.pa.us Search: Composting

backyardcompost.cas.psu.edu/

Recycled Crafts
www.kidsdomain.com/craft/irec.html

www.handcraftersvillage.com/recycled.htm

Topo and Geological
www.dcnr.state.pa.us/topogeo/places.aspx

"The Geology of Pennsylvania" to purchase a copy, contact the State Bookstore, Commonwealth Keystone Building, 400 North Street, Harrisburg, PA 17120-0053 or (717) 787-5109

Watersheds
www.epa.gov/adopt

www.wgby.org/edu/crei/pages/watershedcurriculum.pdf

outreach.ecology.uga.edu/watershed/qcc.html

www.bayeducation.net/lessons.html

Pennsylvania Laws
www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/FACTS/Act101.htm

www.pacode.com

Enforcement Agencies
www.psp.state.pa.us

www.dcnr.state.pa.us

www.fish.state.pa.us

www.pgc.state.pa.us

www.dep.state.pa.us

Environmental Info
www.epa.gov

Pennsylvania Manufacturers and Distributors of Recycled Items

Adhesives Research, Inc.
PO Box 100
Glen Rock, PA 17327
717 235-7979
Products Handled:
Label Stock

Aeolian Enterprises
One Lloyd Ave Pl
Latrobe, PA 15650
724 539-9460
www.aeo1.com
Products Handled:
Lumber
Picnic Tables
Chairs

Agrecycle
PO Box 38783
Pittsburgh, PA 15238-8783
Products Handled:
Compost

American Recycled Wood & Pallet
2069 New Castle Road
Portersville, PA 16051
724 368-8099
Products Handled:
Coffins

American Renaissance Paper
33 Rock Hill Road
Bala Cynwyd, PA 19004
610 668-7200, 800 961-3388
www.renpaper.com
Products Handled:
Printing Paper—Copy

American Thermoplastic Company
106 Gamma Dr
Pittsburgh, PA 15238
412 967-0900, 800 245-6600
www.binders.com
Products Handled:
Binders
Clipboards
Report Covers
Tab Indexes

Armstrong World Industries
1507 River Rd
Marietta, PA 17547
717 426-7122

Products Handled:
Tiles—Ceiling

Armstrong World Industries
PO Box 3001
Lancaster, PA 17604
717 397-0611
Products Handled:
Tiles—Floor

BJM Industries, Inc.
RD 1, Box 257-A
Kittanning, PA 16201
724 548-2440
www.nb.net/~bjm
Products Handled:
Lumber

Black Rhino Recycling
4503 Lebanon Church Road
West Mifflin, PA 15122
412 460-0160
Products Handled:
Lumber

Bristol Pipe
88 Newport Road
Leola, PA 17540
717 656-2526
www.bristolpipe.com
Products Handled:
Pipe

Carlisle Tire & Wheel Co. D/B/A Playguard & Softpa
PO Box 99
Carlisle, PA 17013
800 851-4746
www.carlisletire.com
Products Handled:
Mats—Exercise
Mats—Fatigue
Mats—Golf
Mats—Hockey
Surfacing—Playground

Cedar Hollow Recycling
100 Paradise St
Phoenixville, PA 19460
610 983-0193
Products Handled:
Aggregate Base Materials

Coffee Vest Co.
407 Emerson Ave
Pittsburgh, PA 15215
412 782-1428
www.coffeevest.com
Products Handled:
Bags—Tote
Books, Journal
Clothing—Ties
Clothing—Vests
Purses

Confab Corporation
601 Allendale Road
King of Prussia, PA 19406
610 687-5100
Products Handled:
Diapers

Connelly Container
Righters Ferry Rd
Bala Cynwyd, PA 19004
610 617-0600
Products Handled:
Corrugating Medium

Cougle's Recycling Inc.
1000 S 4th St
Hamburg, PA 19526
610 562-8336
Products Handled:
Lumber

Crafco, Inc.
1680 E Race St
Allentown, PA 18103
610 264-7541
Products Handled:
Asphalt—Crack Sealant

Curtis 1000
145 James Way
South Hampton, PA 18966
800 441-9292
Products Handled:
Printing Paper—Cover stock

Dart Container Corp.
60 E Main St
Leola, PA 17540
717 656-2236
www.dartcontainer.com
Products Handled:
Feedstock—Pellets PS

Delta Paper Corporation
6400 Bristol Pike
Levittown, PA 19057
215 547-6000, 800 444-6700
www.deltapaper.com
Products Handled:
Packaging

Dodge-Regupol Inc.
PO Box 989
Lancaster, PA 17608-0989
717 295-3400
www.regupol.com
Products Handled:
Blocks—Patio
Expansion Joint Fillers
Flooring
Flooring—Equine Safety
Flooring—Gun Range
Flooring—Weight Room
Liners—Truck Bed
Mats—Exercise
Mats—Golf
Mats—Hockey
Surfacing—Athletic
Surfacing—Playground
Underlay—Carpet
Underlay—Dimpled Shock Pad
Underlay—Hardwood Flooring

Drug Plastics & Glass Co., Inc
One Bottle Dr
Boyertown, PA 19512
610 367-1000
Products Handled:
Bottles

DuMor, Inc.
PO Box 142
Mifflintown, PA 17059
717 436-2106 800 598-4018
www.dumor.com
Products Handled:
Benches
Tables
Receptacles
Planters

East Penn Mfg. Co., Inc.
Deka Rd
Lyron Station, PA 19536
610 682-6361
Products Handled:
Batteries—Automotive
Batteries—Industrial
Batteries—Marine

Emert Grinding
133 Bicycle Road
Somerset, PA 15501
814 445-3703
Products Handled:
Guard Rail Blocks
Mats
Surfacing—Playground
Tiles—Floor

Erie Energy Products, Inc.
1400 Irwin Dr
Erie, PA 16505
814 454-2828, 800 233-1810
Products Handled:
Absorbents
Feedstock—Filler Fibers
Insulation—Cellulose Loose-Fill
Insulation—Cellulose Spray
Mulch—Hydroseeding
Packaging—Shredded Paper

Everlast Plastic Lumber Inc.
100 S 4th St
Hamburg, PA 19526
610 562-8336
www.everlastlumber.com
Products Handled:
Lumber

General Recreation, Inc.
PO Box 440
Newtown Square, PA 19073
800 726-4793
Products Handled:
Benches—Park
Picnic Tables
Playground Equipment

Good Heavens
PO Box 897
Narberth,PA 19072
610 668-1897, 888 745-8456
www.goodheavens.com
Products Handled:
Bags—Gym
Clothing—Head Bands
Clothing—Jackets
Clothing—Neck Warmers
Clothing—Sweater
Clothing—T-Shirts
Clothing—Vest
Cushions—Stadium
Throw Covers

Grandview Nurseries
2721 Ipnar Rd
North Huntington, PA 15642
724 863-8979
Products Handled:
Compost

Greenline Paper Company
631 S Pine St
York, PA 17403
717 845-8697, 800 641-1117
www.greenlinepaper.com
Products Handled:
Computer Paper—Form Bond
Computer Paper—Greenbar
Diskettes
Envelopes
Fax Paper
File Folders
File Folders—Hanging
Pads
Printing Paper—Bond
Printing Paper—Copy
Self-stick Removable Notes
Tissue—Facial
Tissue—Toilet

Grow Joe, Inc.
832 Jacksonville Road
Bellefonte, PA 16823
800 881-7288
www.growjoe.com

Products Handled:
Plant food

Henry Molded Products, Inc
71 N 16th St
Lebanon, PA 17042-4502
717 273-3714
www.henry-molded.com
Products Handled:
Containers—Floral
Flower Pots
Packaging—Cushion
Packaging—Custom-Molded
Packaging—Internal
Packaging—Protective
Pallet Stakker

Insul-Board Inc.
PO Box 8103
Erie, PA 16505
814 833-7400, 800 366-6814
Products Handled:
Insulation—Air Vents
Insulation—Block Core Fill
Insulation—Door Cores
Insulation—Perimeter/Foundation
Packaging—Cushion

International Envelope Company
2 Tabas Ln
Exton, PA 19341-2753
610 363-2727
Products Handled:
Envelopes

Keslick & Sons Modern Arboriculture Products
214 W Penn St
West Chester, PA 19380
610 696-5353
www.chesco.com/~treeman
Products Handled:
Tree Band Aides
Tree Ties

Leapfrog Technologies
1408 11th Ave
Altoona, PA 16601
800 443-7647
Products Handled:
Absorbents

Leo Sewell Art
3614 Pearl St
Philadelphia, PA 19106
215 387-8207
Products Handled:
Sculptures

Littlearth Productions
2211 5th Ave
Pittsburgh, PA 15219
412 471-0909
www.littleearth.com
Products Handled:
Backpacks
Furniture—CD stands

Mats From Flats
82 Fox Hollow Rd
Pequea, PA 17565
717 284-3094
Products Handled:
Mats

Max International Converters Inc.
2360 Dairy Road
Lancaster, PA 17601
717 898-0147, 800 233-0222
www.maxintl.com
Products Handled:
Adding Machine Rolls
Cash Register Rolls
Computer Paper—Carbonless
Computer Paper—Continuous Bond
Fax Paper—Thermal

Miller's Wood Recycling
65 Industrial Park Rd
Lewistown, PA 17044
717 248-WOOD
Products Handled:
Animal Bedding
Mulch

Morco Inc.
125 High St
Cochranton, PA 16314
800 247-4093
www.morcoline.com
Products Handled:
Pens
Rulers

Nelson Alternative Disposal
9081 Peach St
Waterford, PA 16441
814 864-7176
Products Handled:
Compost

New Castle Battery Company
3601 Wilmington Rd
New Castle, PA 16105
724 658-5501, 800 562-8600
www.turbostart.com
Products Handled:
Batteries—Automotive

New Pig Corporation
1 Pork Avenue
Tipton, PA 16684-0304
814 684-0608
www.newpig.com
Products Handled:
Absorbents
Mats—Absorbent
Tiles—Floor

Omega Transworld Ltd.
2400 Leechburg Road
New Kensington, PA 15068
800 541-1575
Products Handled:
Concrete

P. H. Glatfelter Company
228 South Main St
Spring Grove, PA 17362
717 225-4711
Www.glatfelter.com
Products Handled:
Envelopes
Printing Paper—Book
Printing Paper—Film-Coated
Printing Paper—Offset

PPG Architectural Finishes, Inc.
151 Colfax St
Springdale, PA 15144
412 274-4500
Products Handled:
Paint

PRS Materials, Inc.
PO Box 1409
Collingdale, PA 19023
610 532-3960
Products Handled:
Absorbents—Lawn & Garden
Compost
Mulch—Hydroseeding

Penn-Pro Manufacturing
Henderson Ave & Wallace Ln
Washington, PA 15301
724 222-6450
Products Handled:
Insulation—Cellulose
Mulch—Hydroseeding

Performance Sports Apparel
1047 Macarthur Rd
Reading, PA 19605
610 373-5300
Products Handled:
Clothing

Permagrain Products Inc.
4789 W Chester Pike
Newtown Square, PA 19073
610 353-8801
www.permagrain.com
Products Handled:
Flooring

Phoenix Recycled Plastics Corporation
225 Washington St
Conshohocken, PA 19428
610 940-1590
www.plasticlumberyard.com
Products Handled:
Barriers—Safety
Benches—Locker
Benches—Mall
Benches—Park
Blocks—Truck
Containers—Trash
Curb
Decking
Docks
Fencing—Privacy
Fencing—Ranch Fencing & Gates
Flooring—Animal
Lawn Furniture
Lumber
Pallets
Parking Bollards
Parking Stops
Picnic Tables
Posts—Fence
Posts—Sign & support
Posts _ Support Pilings
Sheets—Multi-Purpose Flat
Shore Erosion Protection
Speed Bumps
Stadium Seathing
Timber—Landscape
Toilet Partitions
Traffic Barricades
Walkways—Boardwalks
Walkways—Bridges
Walkways—Portable

Polytek Pennsylvania Inc.
811 Progress Rd.
Chambersburg, PA 17201
717 267-0599
Products Handled:
Feedstock—Crumb

Port Erie Plastics
909 Troupe Ave
Harborcreek, PA 16421
814 899-7602
www.skidmarx.com
Products Handled:
Pallets

Quality Fence & Supply Ltd
2670 Division Hwy
New Holland, PA 17557
717 355-7100
Products Handled:
Lumber

Rehrig Pacific Company—PA
1738 W 20th St
Erie, PA 16502
814 455-8023, 800 458-0403
Products Handled:
Containers—Curbside Pick-Up
Containers—Drop Off
Containers—Fine Paper Collection
Containers—Home/Office Bins
Containers—Newspaper Collection
Containers—Refuse

Safety Turf, Inc
PO Box 820
Oaks, PA 19456
610 666-1779
Products Handled:
Surfacing—Playground

Santana Products/ Laminations Inc.
PO Box 2021
Scranton, PA 18501
570 343-7921, 800 368-5002
www.hinyhider.com
Products Handled:
Benches—Locker
Sheets—Plastic
Shower Dividers
Toilet Partitions
Urinal Screens
Vanities

Specialty Plastics Unlimited, Inc
765 Skippack Pike, Suite 200
Blue Bell, PA 19422
215 628-3400
www.specplast.com
Products Handled:
Benches
Containers—Trash
Decking
Fencing
Lumber
Parking Stops
Picnic Tables
Playground Equipment
Speed Bumps

Spectrum International Inc
1 Lasley Ave, Hanover Indl Estates
Wilkes-Barre, PA 18706

570 824-2500
Products Handled:
Containers

St. Jude Polymers
110 Industrial Park
Frackville, PA 17931
570 874-1220
Products Handled:
Feedstock—Pellets PET
Sheets

Total Recycling
RD 1, Box 170
Boswell, PA 15531
813 629-5675
Products Handled:
Blocks

Trafcon
81 Texaco Road
Mechanicsburg, PA 17055
717 691-8007
Products Handled:
Bases—Portable
Traffic Barricades

Tussey Mountain Recycling
RD 1, Box 53-A
Pittsfield, PA 16340
800 473-5647
Products Handled:
Animal Bedding

United Receptacle Inc.
PO Box 870
Pottsville, PA 17901-0870
717 622-7715
www.unitedrecept.com
Products Handled:
Containers—Recycling
Containers—Refuse
Urns

White Light Productions
505 Reeds Road
Downingtown, PA 19335
610 18-0645
www.whitelightproductions.com
Products Handled:
Seaglass jewelry

Wilson's Service Center
17138 Baron's Road N
Stewartstown, PA 17363
717 993-2523
Products Handled:
Mats—Floor

Windsor Barrel Works
PO Box 47
Kempton, PA 19529
610 756-4344, 800 527-7848
www.windsorbarrel.com
Products Handled:
Containers—Drop-Off

Yates Company
PO Box 8247
Erie, PA 16505
814 833-1191
Products Handled:
Custom Extrusions

Zeager Bros., Inc
4000 E Harrisburg Pike
Middletown, PA 17057
718 944-7481
Products Handled:
Mulch
Surfacing—Playground

Names _____ Group # _____
_____ Date _____
_____

SOLID WASTE MANAGEMENT METHODS

Criteria **Does this method:**	**Recycling**	**Waste to Energy**	**Landfill**	**Incinerator**
Get rid of trash?				
Cost per ton?				
Save money?				
Make money?				
Take up space?				
Cause pollution?				

Names _____ Group # _____
_____ Date _____
_____

Recycling In My Home

Directions: Many households recycle much of their garbage. Does yours? For one week keep track to what happens to the following waste products in your home: paper, steel cans, aluminum, plastic, glass, corrugated cardboard, paperboard (cereal boxes), leaves/yard waste.

Waste Product	Recycle or garbage	Mandatory or Voluntary	How often	Where does it go from here
Plastic				
Glass				
Steel Cans				
Aluminum Cans				
Paper				
Paperboard				
Corrugated				
Leaves/yard waste				

What does your family do with hard to recycle items such as: appliances, batteries, Christmas trees, bulky waste, tires, electronics, tires?

Does your family participate in any recycling events? _____

Does your family compost? _____

Names _____ Group # _____
_____ Date _____
_____

Solid Waste in My Home

Choose either a fast food meal or a home-prepared meal. Now record the data of how much waste one meal produces.

For Home-Prepared Meals:

1. Weigh and record amount of food that would be thrown away. Do not count leftovers.
2. Weigh and record amount of waste that would be thrown away. (napkins, paper towels, cans, boxes, mixes from the meal preparation, ect.)

For Fast Food Meals:

1. Weigh and record wrappers, plastic ware, lids, straws, and condiment packages.
2. Weigh and record any food that would be thrown away.

Answer the following questions.

1. What happens to this waste? _____
_____

2. Do feel that your meal produced a small/ large amount of waste? Explain. _____
_____
_____

3. What types of food produced the smallest amount of waste? Why? _____
_____

4. What types of food products produced the largest amount of waste? Why?_____
_____

5. Would you consider fast food packages a problem? Explain your answer. _____

6. Would you be willing to change your lifestyle in order to reduce solid waste from meals? How could you do this?_____

7. Was your meal waste recyclable? Hard to recycle? Reusable? _____

Composting **Name**_____

Date_____

1. List the ingredients in your compost cup:

2. Make your hypothesis: (what is going to occur to each ingredient?)

3. What surprised you most during your composting experience?

4. What were your results?

5. Do you think your school should incorporate composting as part of a recycling program? Why or Why Not? Choose a side and explain your answer.

6. Complete the flow map (Additional Tools) explaining the process of composting.

Name:_____ Date:_____

Composting Vocabulary

Directions: Define each vocabulary word below.

1. **Aerobic:**_____
2. **Anaerobic:**_____
3. **Browns:**_____
4. **Greens:**_____
5. **Nitrogen:**_____
6. **Carbon:**_____
7. **Methane:**_____

Name: _____ Date:_____

Energy

Define and describe each type of energy resource.

1. Solar energy is

2. Geothermal energy is

3. Nuclear energy is

4. Hydroelectric energy is

5. Wind energy is

6. Biomass energy is

7. Fossil fuels are

Give the definitions:

Renewable energy is
_____

Nonrenewable energy is
_____.

Circle the correct word to identify each as renewable or nonrenewable

1. solar-- renewable or nonrenewable
2. geothermal-- renewable or nonrenewable
3. nuclear-- renewable or nonrenewable
4. hydroelectric-- renewable or nonrenewable
5. wind-- renewable or nonrenewable
6. biomass-- renewable or nonrenewable
7. fossil fuels-- renewable or nonrenewable

Complete the chart and describe and illustrate the advantages and disadvantages for each resource.

Energy Source	Advantage	Disadvantage
Solar		
Geothermal		
Nuclear		
Hydroelectric		

Wind		
Biomass		
Fossil Fuels		

What is your recommendation for the best choices for energy resources in the future? Why?

Examining Product Lifecycles

The lifecycle of a sports shoe

Vinyl trim made from Venezuelan petroleum.

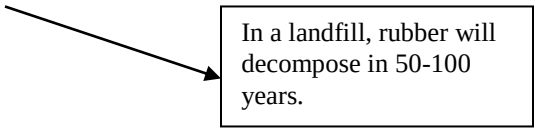
How long will it take for vinyl to decompose?

Cotton field used to be a forest.

Canvas upper from Mexico cotton.

In a landfill, cotton will decompose in 50-100 years

Rubber sole from a tree in Malaysia that's 20 years old.



Examine the diagram and answer these questions

1. What is the shoe made of? Are these components renewable or nonrenewable?
2. Where did these components come from? How long have those been around? (See the solid boxes and arrows.)
3. Where will the shoe's components go when you dispose of the shoes? How long will the components be around then?
4. Can you add other information to the diagram to tell more of the shoe's history? To begin, complete the information about the petroleum and the vinyl. Extend the diagram with additional paper, if needed.

Name_____ Date_____

Examining Product Lifecycles

Directions: Choose a product from the product list that you use each day and create a timeline of the product's lifecycle, similar to the one on the previous page.

Checklist:

- Include at least two of the product's major components. (Components are the things the product is made of.)
- Identify whether each component is renewable or nonrenewable.
- Show where each component came from and where it was 10, 50 (or more!) years ago.

- Show where each component will be in 50, 100, or 500 years in the future. (Note: even biodegradable materials tend to decompose very slowly in landfills)

Write your responses to these questions and turn them in with your timeline.

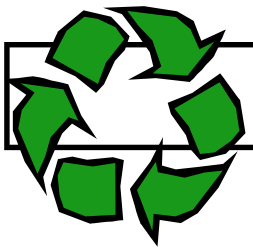
1. Was this assignment difficult? Why or why not?
2. What sources did you check to locate information on your product?
3. How difficult or easy was it to find information about your product's components, where they come from and how long they take to decompose?
4. If you found it difficult to find information, why do you think this is so?
5. Should consumers be more informed about how products are made? Why or why not? Provide reasons for your response.
6. Would it change your purchasing decision if you knew more about the production of the product? Why or why not?

PA CleanWays

Environment and Ecology Curriculum For Intermediate Students

Teacher's Guide

PA CleanWays • 105 West Fourth Street • Greensburg, PA 15601
PH: 724.836.4121 • WEBSITE: www.pacleanways.org • E-MAIL: info@pacleanways.org



What is Recycling? Really….

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Identify materials that can be recycled in the community.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Science and Technology

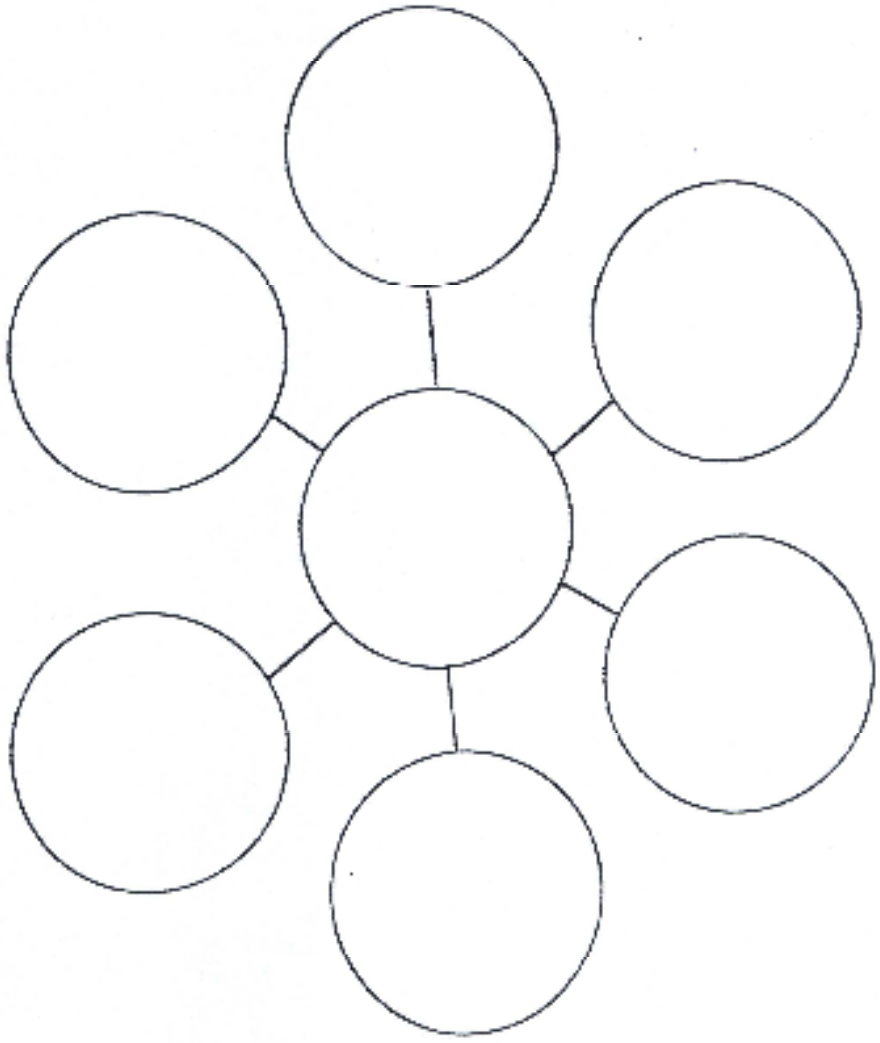
Recommended Grade Level: Intermediate
Objectives:
The purpose of these activities is for students to understand the role of recycling and waste management in their community. This will allow students to make knowledgeable disposal choices and support informed decisions about waste management at school and home.

Students will:
1. Conduct a community investigation to discover what the options are for dealing with trash in their community.
2. Become knowledgeable about the laws, municipal agencies, private companies and coordinators who manage solid waste issues in their community.
3. Based on their community investigation, students will create a list of additional questions for local experts to answer when invited into their classroom.
4. Students will invite a waste management representative to speak to the class or visit a transfer station, waste-to-energy facility or landfill in their community to learn first hand what the waste handling process looks like and how it is managed.

Materials:
1. Enclosed Community Investigation
2. Chart paper for brainstorming
3. Phone access and telephone book
4. Access to the Internet (if available)
5. Transportation for field trip

Activity, Step 1—Initial Brainstorming (Use a Web format)
1. Using the chart paper, write the word trash in the center and put a circle around it.
2. Ask students to brainstorm the kinds of trash they produce. (i.e. paper, food scraps, plastic, metal, tires, magazines, etc.) Draw a line out from the center circle and write each category of trash in another circle.
3. Now, brainstorm where they think that trash SHOULD go. Write their ideas in additional circles radiating out from the 'kinds of trash' circles.

Activity, Step 2—Community Investigation
1. Before you begin, hand out the Community Investigation and ask students to read through it. See if they have ideas on what some of the answers are. They could pencil them in and then do research when they actually begin the investigation to see if they are accurate.
2. Have them make a list of who they need to contact and brainstorm questions so that they won't have to call them back.
3. Once they complete the Community Investigation, make a list of additional questions or things to find out about. Invite local experts in to be interviewed or do it over the phone.
4. Visit part or all of the waste disposal process in your community. Take a field trip to the transfer station, waste to energy facility or landfill to see what this process looks like and how it is managed.



Community Investigation

Community Questions

1. Does my community have mandated (required by law) waste pickup? Yes ☐ No ☐

2. Who are the waste haulers in my community? *(Use chart below and include addresses and phone numbers; you might need them later.)*

   Indicate whether they are:
   Local haulers,
   Municipal employees *(work for the municipality),* or are they part of a large
   National (or regional) waste hauler.

   Do they offer curbside recycling as part of their services?

   Identify Waste Haulers

Name	Address	Phone	L, M or N	Recycle? Y or N
•				
•				
•				
•				
•				

3. Is my community mandated to have a recycling program? Yes ☐ No ☐

4. Does my county have a designated recycling coordinator? (*Who–name, address, telephone number)*

_____

_____

_____

Community Investigation: Continued

5. What does my community collect for recycling? (*Paper, glass, plastic, aluminum and steel cans, newspaper, magazines. Municipalities are usually only mandated to recycle three items, some recycle more.)*

_____

_____

6. Is there a permanent drop off recycling location and/or annual one-day community collections of hard to recycle items at various locations throughout the community? *(Appliances, batteries, Christmas trees, bulky waste, tires, electronics, etc.)*

_____

_____

7. Where does the hauler take the recycled items? Where are they sent from there?

 plastic _____

 glass _____

 aluminum _____

 steel cans _____

 paper _____

 corrugated _____

 appliances _____

 batteries _____

 tires _____

 Christmas trees _____

 leaves/yard waste _____

Community Investigation: Continued

8. Do the recycled items generate money? Does it cover the recycling costs?

_____

9. Does my community collect leaves and/or other organic material and compost them?

Yes ☐ No ☐

10. Find out where the trash goes after it is picked up: To which landfill(s) or waste to energy plants, the cost per ton, and what they take and don't take, (*tires, metal, paint, leaves, brush, construction waste, HHW, computers, etc.)*

Landfill or Waste to Energy Plant	Cost per ton	Exception (Items they do not take)

11. If your county has a waste to energy plant, where does the burned ash go? Are there any special regulations about handling it?

_____

12. How does my community handle the items that are NOT accepted by the landfill or waste to energy plant? Any special collections?

_____

_____

13. How many years of landfill space are remaining at landfills used by my county? How has the county planned for additional capacity after that time?

_____

_____

13. If your county has a local solid waste authority, find out who serves on it, when they meet, and the issues they are working on. Attend some meetings and ask your county recycling coordinator or solid waste coordinator how your county plans for solid waste disposal and recycling.

14. Research which businesses, industry, government agencies and colleges in your community recycle.

_____

_____

15. Find out what other organizations (non-profit, youth, watershed groups, environmental, business clubs, etc.) have special collections, support recycling or help communities manage waste.

_____

Recycling in My Community

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Identify materials that can be recycled in the community.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Mathematics
Science and Technology

Recommended Grade Level: Intermediate
Objectives:
The purpose of this activity is for students to discover what items can be recycled in their community and what items are being recycled in their community.

Students will:
1. Use the information gathered in their Community Investigation to find out what opportunities exist in their community for getting rid of recyclable hard-to-dispose items, such as appliances, tires, mattresses, furniture, electronics.
2. Understand the role of their county recycling coordinator.
3. Research recycling: discover what can be recycled and what it is used for.
4. Find ways to share this information with their family, fellow students and community.

Materials:
1. Completed Community Investigation
2. Copies of Student Page
3. Phone access and telephone book
4. Access to the Internet (if available)

Activity, Step 1—Community Investigation
1. Once students complete the Community Investigation, they will know what their community recycles and can then do research to find out what other opportunities there are.
2. Ask students to complete the Student Page individually or with a partner.

Activity, Step 2—Share Information
1. When students have finished the research portion of the Student Page, have them brainstorm ways to share what they have learned with their family, fellow students and their community. Have them implement several of these projects.

Activity, Step 3—Speaker
1. Have students discover whether there is a recycling coordinator in their county and invite them in to share what is happening locally. Have the students prepare questions ahead of time.

Recycling in My Community

1. Use the information you gathered during your Community Investigation to discover HOW and WHEN your community has opportunities for hard-to-recycle items such as appliances, tires, mattresses, furniture, electronics, etc. How can community members find out about them, how much do they cost the community and how are they paid for?

2. Do research on the Internet to find out all you can about **recycling**. Then find ways to share this information with your family, fellow students, and community. Here are some questions to start with:

   A. What are 6 of the most commonly recycled items?

   B. List 1-4 things that can be made out of each one. Make a game for your family, friends or other students to match the recycled item with what it is made into.

   C. What is done to the discarded item (such as a plastic bottle) to recycle it into another item (such as a fleece jacket)? What are the steps of the process to get the bottle made into the jacket?

   D. Make a poster to illustrate 2-3 of the processes you learn about. Share it with others.

   E. List 6 things you can do to recycle waste.

   F. Think about newspapers. Make a list of all the things you can do to reduce using them, to reuse them and to recycle them. Illustrate this.

   G. When you are shopping, how can you tell if something is recycled?

   H. Why are recycled items sometimes more expensive than others?

   I. What can we do to help the cost of these items go down?

   J. Choose one of the things you found most interesting and create a presentation with visuals to share with kids in a younger grade. Do it with a partner if that works better for you.

   K. Does your county have a recycling coordinator? (Sometimes another environmental organization serves in this job. In Westmoreland County, the local Keep Westmoreland County Beautiful provides their residents with recycling opportunities.) Invite them to speak to your class or see if you can visit them and ask questions. Be sure to prepare questions before your meeting.

Earth 911 is great website that can help you find out what is happening with recycling in your community. Their website is **www.earth911.org** and they also have a kid's section.

Check out the Pennsylvania Recycled Products Manufacturers' list on the PA Dept. of Environmental Protection website at **www.dep.state.pa.us** by typing "buy recycled" into the keyword search and learn where you can get recycled products made in Pennsylvania. Visit one of the sites nearby, if possible.

Student Page Answers

A. Aluminum, steel cans, glass (clear, green and brown), plastic, paper, corrugated cardboard, tires, kitchen waste and yard waste (leaves)

B. **Aluminum** — new aluminum cans, window frames, rain gutters
Steel — automobiles, notebook wire, toys, bicycle frames
Glass — new glass
Plastic soda bottles, peanut butter jars (PET plastic) — carpet, insulation, shower curtains, fleece material (Polar fleece)
Plastic milk jugs, detergent bottles (HDPE plastic) — toys, lumber for decks (Trex)
Foam cups, carry out containers (Polystyrene) — rulers, pens, toys
Newspaper — Homosote (bulletin board material, sound proofing), wallboard, animal bedding, kitty litter
Corrugated Cardboard — new cardboard
Tires — Running track, soaker hoses, crumb rubber, "mulch", flooring
Leaves, fruits & vegetables — compost

C. See Resources for more detailed explanations.
Plastic is separated into varieties—cleaned and washed—shredded into tiny squares—melted—then either made into pellets and used for plastic lumber or spun into fiber
Aluminum and steel are melted down and formed into ingots (squares or rectangles) then rolled into sheets or formed for further use.
Glass is separated by color, melted and formed into new items
Newsprint, paper and cardboard is de-inked (depending on its intended reuse), chopped into small pieces and then pressed together (sometimes with other materials.)
Tires are chipped into small pieces. At the proper size, they can be burned as fuel in certain manufacturing processes. A bit larger, they can be used as is for play ground "mulch" and tracks, or formed into hoses and flooring.
Leaves and kitchen waste can be piled together, moistened and turned often to break down into rich compost which can be used for planting and mulch.

D. Share your poster with others. Offer a mini lesson to those in younger grades or put together a display of trash/recycling info for Earth Month.

E. Find ways to recycle the materials your community doesn't collect—

- Recycle paper, newspapers, plastic containers, metal, aluminum beverage cans, glass, motor oil, batteries, and anti-freeze.
- Recycle your used appliances and vehicles at your local scrap dealer's yard.
- Recycle tires at local collection events, if available, or ask your county recycling coordinator where you can recycle them.
- Recycle ink and toner cartridges at the store where you purchased them, or send back to the manufacturer. Some counties have local collection events for these items.
- Recycle electronics including computers, monitors and printers. Collections for these types of items are called e-cycling events.
- Request recycled paper for photocopying.
- Ask your bank, phone, gas and power companies to use recycled paper for their bills, notices, and statements.

Ask your school to use recycled paper and participate in your local curbside program or take your recyclables to drop-off locations. To learn about your nearest locations for recycling, go to **www.earth911.org** and type in your zip code.

F. Newspapers—
   - Go to the library or other public place to read them.
   - Share a subscription with someone else.
   - Read it online.
   - Only get the Sunday paper if you don't have time to read all the weekday ones.
   - Use them for wrapping paper (comics are colorful).
   - Use them in your garden as mulch between rows and around plants.
   - Contact farmers or your Cooperative Extension office to find out who uses them. Leave them at a drop off spot for a farmer to pick up and shred for animal bedding.

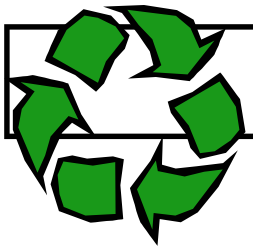
G. Look on labels, tags or the bottom of the product.

can be recycled.

made from recycled materials.

H. There may not be a consistent supply of raw (recyclable) materials and/or the manufacturing process may cost more than it would be to manufacture from virgin materials. Fluctuation in the market prices may also affect the cost of making items from recycled materials.

I. Continue to participate in recycling, encourage others to recycle and buy recycled items. When a larger number of "recycled" items are purchased from the manufacturer, the selling price of the products will decrease.



Closing the Loop & the 3 Rs

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Explain the process of closing the loop in recycling.
- Describe methods that could be used to reuse materials for new products.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Science and Technology

Recommended Grade Level: Intermediate
Objectives:
The purpose of these activities is for students to understand and explain the process of closing the loop in recycling. They will research and be able to describe methods that could be implemented to reuse materials for new products.

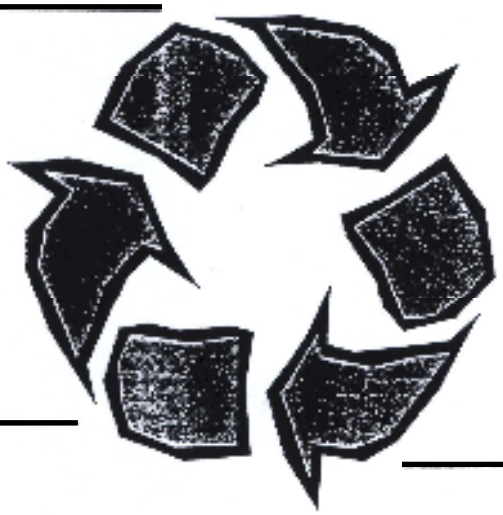
Students will:
1. Research and investigate recycling and the meaning of three chasing arrows in the recycling symbol. When finished they will be able to explain it to others.
2. Create a game that will help friends and family learn about recycling.
3. Research and investigate methods that could be used to reuse materials for new products.

Materials:
1. Resources and Student Page
2. Access to the Internet (if available)
3. Materials to make a "light up" board and directions: heavy cardboard, flashlight light bulb (2.5-3 volt) and socket, 2 extension cords or 24 gauge stranded wire, scissors, electrical tape, duct tape, brass fasteners, 2 batteries (3 volt), markers, pictures of used and reused items (clip art, magazines or hand drawn), and 2 brass rods or 2 large brass fasteners.

Activity, Step 1—Recycling Symbols
1. Decide whether students will work individually or with partners. Have them research recycling and the recycling symbol.
2. Have students create a visual that illustrates the recycling symbol and have them practice explaining it to each other in preparation to explain it to other students and family.

Activity, Step 2—Student Page
1. Have students, alone or with partners, complete the Student Page.
2. Discuss their findings: were they surprised by anything they found out, are their any recyclers nearby, will they change any of their disposal habits?

Activity, Step 3—"Light Up" Board
1. Using the directions for making a "light up" board, have students create a learning game using the materials listed above. Put pictures of used items on the left side and how they could be reused on the right. When the player makes a correct match with the brass rods, the light bulb lights up.



What's the difference?

Closing the Loop & the 3 R's

1. Find out what the three chasing arrows of the recycling symbol stand for.

2. What does it mean to 'close the loop' in recycling?
   (Use the website resource guide)
   *Check out **www.dep.state.pa.us** (Keyword "Buy Recycled")*

3. List 6 things you can do to reduce waste.

4. List 6 things you can do to reuse waste.

5. List 3-5 things that can be done to recycle besides separating your bottles, cans and plastics for collection.

6. List 3-5 things you can do to help folks learn how to buy recycled items, including items that are made in Pennsylvania.

7. List 3-5 things you can do to reduce the number of newspapers you use.

8. How can you tell if something is **able to be** recycled or is **made out of** recycled materials?

Student Page Answers - Activity 3

1. The three chasing arrows create a symbol for recycling because each arrow represents a step in the recycling process.
    - The first arrow represents you, the consumer, putting your recyclables out at the curb or taking them to a drop-off center to be recycled.
    - The second arrow represents those materials being made into new items.
    - The third arrow represents you, the consumer, buying products made from recycled materials and completes the recycling "loop".

2. **"Closing the loop"** in recycling means buying recycled products. This is important because buying recycled creates markets for recycled materials and a demand for materials with recycled content. If we did not buy items with recycled content, recycling would cease to exist. The "loop" needs to stay "active" in order for us to conserve natural resources, energy, clean air, water, landfill space and money.

3. **Reduce** the amount and toxicity of waste you throw away:
    - Buy fewer new products.
    - Buy only amounts of paint, household cleaners and garden products that you actually need.
    - Share items with friends, co-workers, and neighbors (e.g. specialty tools) or rent them.
    - Buy food in bulk (or large packages).
    - Buy durable, repairable products. Avoid paper plates and plastic silverware.
    - Reduce purchases of non-recyclable items (polystyrene, juice boxes, etc.).
    - Buy items with minimum packaging.
    - Bring your own shopping bags.
    - Bring your own mug.
    - Share a magazine subscription or book with a friend.
    - Use your library instead of buying books, magazines and newspapers.
    - Request "no bag" for small purchases.
    - Use cloth napkins, kitchen towels and sponges instead those made of paper.
    - Write the manufacturers of overly packaged products.

Reduce junk mail by writing The Direct Marketing Association at 6 East 43rd St., PO Box 3861, Grand Central Station, New York, NY 10163, and ask to be eliminated from any new mailing lists. To get off existing mailing lists, write or call the companies directly. Many companies have toll-free numbers and postage-paid envelopes. You can also refuse unwanted mail by writing "Refused, Return to Sender" across the unopened envelope and drop it in the mailbox without any additional postage. Or, register online at **www.junkbusters.com**.

4. **Reuse** your containers and products - repair what is broken or give it to someone who can repair it.
    - Reuse plastic and paper bags.
    - Donate ribbon pieces, egg cartons, etc., to preschools for arts & crafts projects.
    - Take your magazines to your doctor's office or hospital waiting rooms to share them.
    - Use comics for wrapping paper.
    - Line your garden beds with seven layers of old newspapers, then apply mulch.
    - Create mini-greenhouses for your plants from used milk jugs or soda bottles.
    - Plant seeds in used beverage containers and watch them grow.
    - Wear hand-me-down clothes.
    - Use tattered T-shirts and other clothing for car polishing and cleaning rags.
    - Save your favorite old clothing and make a quilt or have one made for you.

- Return wire coat hangers to the dry cleaners.
- Donate usable furniture and clothing to thrift shops or have a yard sale.
- Make double-sided copies when using copier machines.

5. **Recycle** as much as possible and buy products with recycled content:
    - Recycle paper, newspapers, plastic containers, metal, aluminum beverage cans, glass, motor oil, batteries, and anti-freeze.
    - Recycle your used appliances and vehicles at your local scrap dealer's yard.
    - Recycle tires at local collection events, if available, or ask your county recycling coordinator where you can recycle them.
    - Recycle ink and toner cartridges at the store where you purchased them, or send back to the manufacturer. Some counties have local collection events for these items.
    - Recycle electronics including computers, monitors and printers. Collections for these types of items are called e-cycling events.
    - Request recycled paper for photocopying.
    - Ask your bank, phone, gas and power companies to use recycled paper for their bills, notices, and statements.

Ask your school to use recycled paper and participate in your local curbside program or take your recyclables to drop-off locations. To learn about your nearest locations for recycling, go to **www.earth911.org** and type in your zip code.

6. **How to Buy Recycled**:
    - Look for products that contain recycled content and purchase them to close the loop on recycling. If you're not "buying recycled," you're not recycling.
    - Shop at businesses offering recyclable or biodegradable products or packaging.
    - At the grocery store, check for environmental symbols on the labels of cereal, cookie and cracker boxes and laundry detergent and cleaners for containers using recycled content.
    - Purchase recycled paper stationery and office paper.
    - Check out the Pennsylvania Recycled Products Manufacturers' list on the PA Department of Environmental Protection website at **www.dep.state.pa.us** by typing in "buy recycled" into a keyword search and learn where you can get products like these made in Pennsylvania: Paper for labels, lumber, compost, copy paper, binders, clipboards, report covers, ceiling tiles, floor tiles, pipe, mats (exercise, fatigue, golf, hockey), athletic and playground surfacing, tote bags, journals, clothing (ties, vests), purses, diapers, asphalt crack sealant, printing paper, feedstock, packaging, patio blocks, flooring, truck bed liners, carpet underlay, bottles, batteries (industrial, marine and automotive), guard rail blocks, absorbents, insulation, mulch, shredded paper packaging, park benches, picnic tables, playground equipment, polar fleece clothing, gym bags, throw covers, tissue—toilet and facial, diskettes, self-stick notes, floral containers, flower pots, envelopes, tree band aids and tree ties, sculptures, backpacks, CD stands, adding machine and cash register rolls, fax and copy paper, animal bedding, pens and rulers, paint, clothing, trash containers, fencing (privacy, ranch & gates), parking stops, fence posts, speed bumps, stadium seats, toilet partitions, walkways (boardwalks, bridges, portable), pallets, containers (for curbside pickup, drop-off, fine paper collection, home/office bins, newspaper collection, refuse), vanities, containers, blocks, traffic barricades, urns. ***See PA Manufacturers/Distributors for names and addresses of PA companies producing recycled products.***
        - Automotive supplies including batteries, recycled motor oil, and even automobile carpet
        - Bottles and containers made by Owens-Brockway which recycles glass or high-density polyethylene (HDPE) milk jugs and laundry detergent bottles made into

new containers by Graham Packaging Company in York.

- Building materials like plastic lumber for picnic tables, fences, and decks made from milk jugs; insulation made from newspapers; and even ceiling tiles made by Armstrong World Industries of Marietta from old newspapers and phone books. Carlisle Tire and Wheel Company makes playground surfacing and mats from tires.
- Cans and metals are recycled by such companies as the U.S. Steel - Edgar Thompson Works in Braddock.
- In Dillsburg, clothing and accessories, like rag rugs are made from old clothing. Plastic soda bottles are turned into clothing by firms like Good Heavens of Narbareth and Performance Sports Apparel of Reading.
- Yard wastes are made into compost and mulch by a number of companies, and the Henry Molded Products Company of Lebanon makes flower and nursery pots from old newspapers and mixed office paper.
- Such companies as Sonoco of Downington, make paper tubs and packaging partitions from old corrugated cardboard and newspapers create packaging materials.
- Paper and office supplies are recycled and remanufactured by such firms as Greenline Paper Company of York making new office paper from old office paper; American Thermoplastic Company of Pittsburgh making loose-leaf binders from used polyvinyl chloride (PVC); ink cartridges are refilled, and even office furniture becomes new again thanks to Pennsylvania companies.
- Recycling and refuse containers are made from milk jugs and detergent bottles you place in your curbside bin by Rehrig Pacific Company of Erie and Windsor Barrel Works of Kempton.
- For further information about recycling, contact your municipal or county recycling coordinator or solid waste authority. The Pennsylvania Department of Environmental Protection also has recycling information on its website at **www.dep.state.pa.us**.
- To get a list of recycled products made in Pennsylvania, contact the Pennsylvania Resources Council at **www.prc.org**.

7. **Newspapers**

- Go to the library or other public place to read them.
- Share a subscription with someone else.
- Read it online.
- Only get the Sunday paper if you don't have time to read all the weekday ones.
- Use them for wrapping paper (comics are colorful).
- Use them in your garden as mulch between rows and around plants.
- Leave them at a drop off spot for a farmer to pick up and shred for animal bedding.

8. Able to be Recycled or Made out of Recycled Materials

- Look on the tags or label.
- Contact the manufacturer.

Able to be recycled  *Made from* recycled 

Make An Electric Recycling Board

1. On a large piece of heavy cardboard or wallboard, draw or paste pictures of **trash that can be recycled (used)** on the left side of the board and **what that item can be recycled into (reused)** on the right side of the board.

2. Under each picture **make a small hole** (for the brass fasteners.) Also make holes at the top of the board (for the light bulb) and at the bottom left and right hand corners (for the extension cords).

3. **Insert a brass fastener** into each hole that is under the picture.

4. On the back of the chart, **connect the prongs** of the fasteners in pairs with a piece of extension cord split in half (wire exposed to wrap around fastener). **Cut the extension cord** to lengths needed to connect the old product (used) with the correct recycled product (reused).

5. At the top center of the front of the board, **attach a small light bulb** through the hole, screw in to socket and secure with electrical tape.

6. On the back of the board, use duct tape to **attach two batteries** to the board (positive end to negative end).

7. Next, take another piece of old extension cord cut in half, and with duct tape, **attach** one end of one piece of extension cord (with wire exposed) to the **right end** of the battery pairs. **Attach** one end of the other piece of extension cord (wire exposed) to the **left end** of the battery pairs (with wire exposed).

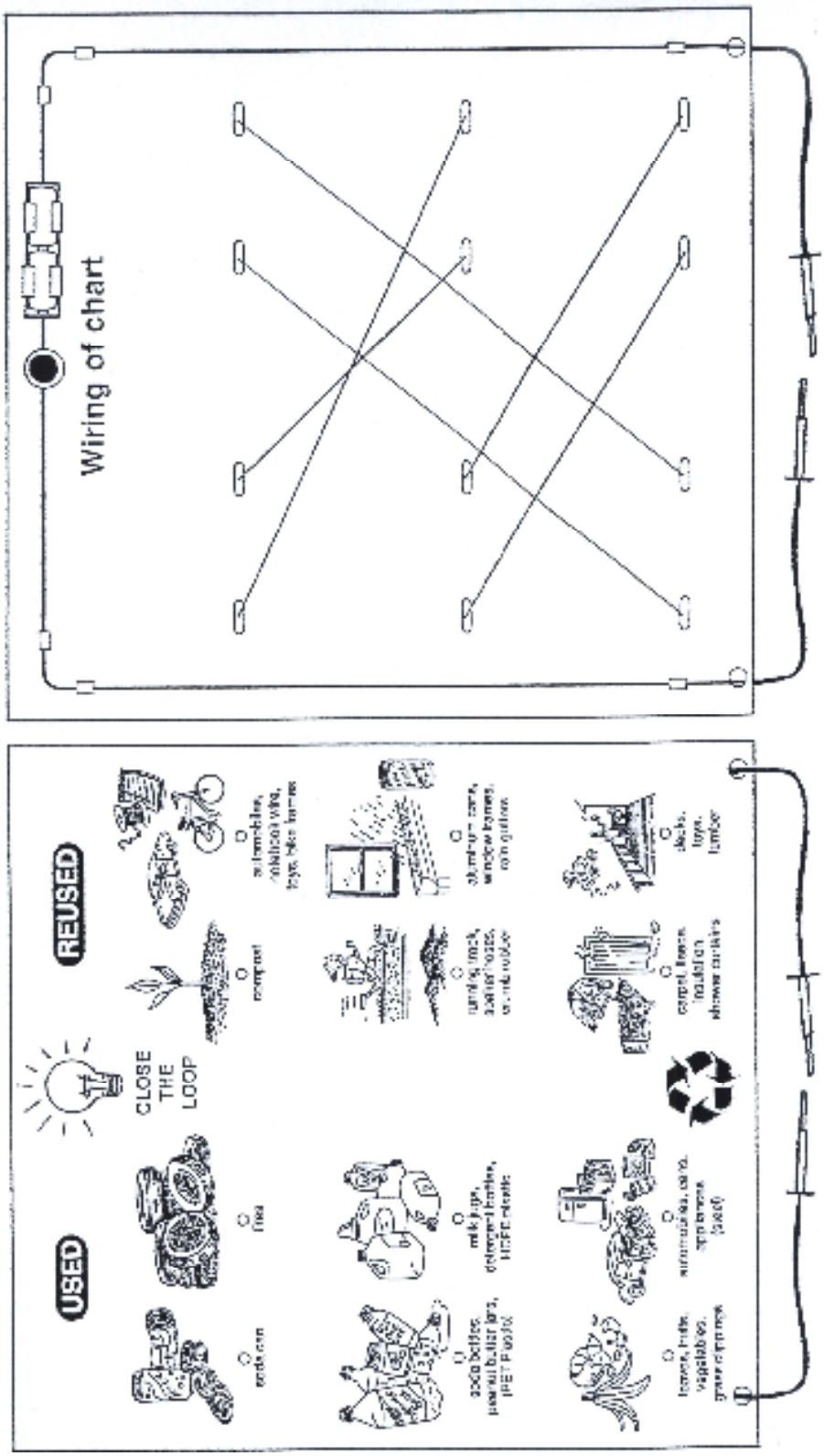
8. At the location of the light bulb, **expose the wire of the extension cord**. Make sure the wire touches the metal on the base of the light bulb. **Secure with electrical tape**, covering all exposed wire.

9. From the back of the board, **tape the excess of the 2 extension cords** around the edge of the chart and through holes at the bottom so they can attach to the rods on the front.

10. **Wrap the exposed wire end of each extension cord around the end of a brass rod or large brass fastener**. Secure with electrical tape, wrapping each rod with enough electrical tape to ensure a safe and comfortable grip. Leave the end of the brass rod exposed. When using the Electric Recycling Board, hold the brass rods by the ends covered in electrical tape. **DO NOT** touch the brass rods.

11. When one rod is touched to the brass fastener under the item to be recycled and the other to what it can be made into, the light bulb will turn on. Keep trying until you get the correct answer!

Make An Electric Recycling Board



Electronic Recycling Board

The recycled items below are suggestions. Customize your electronic board by researching other materials that can be recycled.

Soda cans (Aluminum).....Aluminum cans, window frames, rain gutters

Automobiles, cans, appliances (Steel).....Automobiles, toys, wire

Newspaper (newsprint).....Homosote, wallboard, animal bedding, kitty litter

Tires.....Running track, soaker hoses, crumb rubber, "mulch," flooring

Soda bottles (PET plastic).....Carpet, fleece material, insulation, shower curtains, fiberfill

Corrugated cardboard.....Cardboard

Milk jugs, laundry detergent bottles (HDPE plastic)....Decks, toys, "lumber"

Office paper.....Bathroom tissue, paper towels, packing material, fiberboard

Styrofoam cups, to-go containers (Polystyrene).....Rulers, pens, toys

Leaves, fruits & vegetables.....Compost

Composting… What Happens to Leaves, Grass and Food Scraps?

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Compare the decomposition rates of different organic materials.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Mathematics
Science and Technology

Recommended Grade Level: Intermediate
Objectives:
The purpose of these activities is for students to understand and compare the decomposition rates of different organic materials using hands on learning. They will also learn about what is happening with composting in their community.

Students will:
1. Conduct experiments which compare the decomposition rates of different organic materials.
2. Research the composting opportunities in their community.

Materials:
1. 6 paper coffee cups for each student (with lids)
2. Sturdy disposable or plastic plate to put under each student's cups
3. Soil—from under a tree or shrub that is likely to contain microorganisms.
4. 6 organic, biodegradable items for each student—ex. Piece or orange or banana peel, egg shells, scrap of cotton or wool fabric, apple core, grass, piece of a sandwich, coffee grounds, piece of newspaper or cardboard, cracker, leaves, etc.
5. Spray water bottle
6. Paper and pencils or markers for charting results
7. Access to the Internet (if available)

Activity, Step 1—Brainstorming
1. Begin a brainstorming discussion about decomposition and composting. Find out what students already know.

Activity, Step 2—Monitoring
1. Introduce the Student Page and have students do the first stage of the activity. Have each student make a chart which will monitor when the cup has been sprayed and shaken and record the condition of the biodegradable objects in each cup.

Activity, Step 3—Applying Results
1. During this process, have students research on the Internet what is happening with composting in their community. **www.earth911.org** is a helpful site. Have them share what they learned.
2. Invite a Master Gardener from your local County Conservation District or Keep Pennsylvania Affiliate in to demonstrate composting and answer questions.
3. Work with students to see if there is a way to compost food at school.

What happens to the leaves and yard waste in my community? Can food scraps be recycled?

1. Try this!
   - Half fill 6 paper cups with soil (Carefully dig up some soil under a tree or shrub that is likely to contain microorganisms.)
   - In each one place a different organic, biodegradable item, such as a piece of orange or banana peel, egg shells, scrap of cotton or wool fabric, apple core, grass, piece of a sandwich, coffee grounds, piece of newspaper or cardboard, or cracker.
   - Fill with remainder of soil. Put each cup on a piece of paper and label the cup and the paper.
   - Place on a windowsill or table and spray the container lightly with water until the soil is moist but not soggy.
   - Use a strip of paper to create a chart which will help you keep track or when you water and shake each cup, and also what each item looks like when you uncover it at the end of each week.
   - At the end of every day or so, spray the contents with water then put on a lid and shake the container to allow air and moisture to get between the soil particles and around the items.
   - Keep the lid on overnight to reduce evaporation, but remove it in the morning and leave the container open during the day.
   - At the end of one week poke into the soil with a plastic spoon and see what's happened to the items. Draw a little picture on each piece of paper illustrating what you see. Cover back up with soil.
   - Look again in two, three and four weeks and draw what you see.
   - Which items biodegraded (broke down) most quickly? Which took the longest? Why do you think this happened?

2. Many communities collect leaves and yard waste seasonally. Find out what they do with it. It becomes something useful over time and can save community parks and gardens money when they don't have to buy it. Learn about composting opportunities in your community. The Earth 911 website will help you **www.earth911.org**

3. Work with your teacher to invite someone who knows a lot about composting into your classroom to demonstrate the process and to answer your questions. Brainstorm a list of questions ahead of time.

Observing Composting

Name:_____

Group:_____

Day	Date	Water	Air	Observations & Illustrations
1				
2				
3				
4				
5				
Week 2				
Week 3				

Disposable Products… What Do They Really Cost?

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Evaluate the costs and benefits of disposable products.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Mathematics
Science and Technology

Recommended Grade Level: Intermediate
Objectives:
The purpose of these activities are for students to learn the skills necessary to evaluate the costs and benefits of disposable products. Once students know the "real" cost of a disposable item, the purpose is for them to make wise purchasing and usage choices.

Students will:
1. Identify 5-8 disposable items that they and their family use regularly. (Many kids have grown up with these items and don't realize there are any other choices.)
2. Use their math skills to calculate and compare the costs of using disposable items.
3. Use their reasoning skills to evaluate the benefits of disposable products.

Materials:
1. 5-8 disposable items for each student that they and their family use regularly and toss out when finished with them
2. Paper and pens or markers to make a chart

Activity, Step 1—Brainstorming
1. Brainstorm with your students a list of disposable items they and their families use regularly. Discuss some of the other choices that are available.

Activity, Step 2—Cost Analysis
1. Have students bring in 5-8 items that they and their family use regularly and toss out when finished.
2. Make a chart that lists how much these items cost—then divide that by the number of items or servings in each package to figure out the individual cost. i.e. six-pack of single serving pudding (copy and pass out the student page - use as a guide.)
3. Now have students figure out how much it would cost to make a bowl of pudding using a box of mix and milk — then divide that by the number or servings.
4. Add these costs to your chart.
5. Again, model the process and math skills necessary to determine costs of disposable items so that students can do it on their own or in pairs.
6. Add the cost information for all items to your chart.
7. Have students compare these costs and discuss.

Disposable Products
What does all this cost my community?

1. Choose 5-8 items that you and your family use regularly and toss out when you are finished with them: paper plates, disposable razors, 6-packs of soft drinks, individual serving sized gelatin, fruit or pudding, paper cups, etc.

2. Make a chart that lists how much these items cost—then divide that by the number of items or servings in each package to figure out the individual cost.
   i.e. - a twelve pack of single serving pudding costs $4.59. Divide $4.59 by 12 to learn how much each serving costs— about $.38 each. However, there's a plastic cup and a foil lid that needs to be disposed of.

3. Now figure out how much it would cost to make a serving of pudding using a box of mix and milk.
   i.e. - Pudding mix (for 6 servings) costs $1.39. So $1.39 divided by 6 is $.23 for one serving. Milk costs $2.51 a gallon. There are 16 cups in a gallon and you only need 2 to make the pudding, so divide $2.51 by 16 to find out what 1 cup costs. Then multiply that by 2 because you need 2 cups. So milk costs about $.32. So one serving of homemade pudding costs about $.55 cents a serving. You'll need a reusable plastic container to put your pudding in and that can be used and reused for a long time.

4. Try this with another kid favorite—peaches. An 8 pack of diced peaches in 4 oz. cups is $4.00. Divide $4.00 by 8 and that means each serving costs $.50.

5. A 16 oz. can of sliced peaches costs $.99. There are 4 4 oz. servings in the can so if you divide $.99 by 4, each serving would cost about $.24. Again, you would need a reusable plastic container to carry them to school in.

4. Do this for your other items and see what the costs are!!

5. Now figure out how much waste there is with each option!! What can be recycled or reused and what goes into the trash! Put the figures in your chart and share with others. Whenever we make choices we have to weigh different things such as cost, waste, convenience and commitment to change.

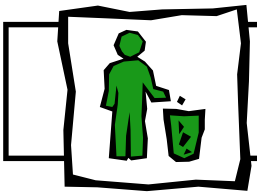
6. Are there any changes you might make in your choices for buying or asking parents to purchase certain items?

Name: _____

Date: _____

Disposable Products...
What Do They Really Cost?

Disposable Item	Cost of Item	Serving Size	Individual Cost	Alternative Item	Cost	+/-
6-Pack Pudding				Pudding Mix		



What's in YOUR Trash?

Classroom Waste Audit

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources
D. Describe the role of recycling and waste management.

- Identify materials that can be recycled in the community.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Mathematics

Recommended Level: Intermediate
Objectives:
The purpose of this project is to track waste for one day and to collect information that will help determine where most of the school's waste is generated. This will allow students to think about how to reduce the amount of waste produced.

Students will:
1. Identify the major components of classroom trash.
2. Be introduced to the idea that garbage doesn't disappear once it is hauled away.
3. Illustrate the quantity of waste that is recyclable and investigate options on how it can be reduced.
4. Brainstorm ideas how the school waste can be reduced.

Materials:
1. Ample space for sorting trash
2. Large protective floor covering
3. Two containers, one for wet waste, one for dry waste
4. Large trash bags
5. Gloves for each student
6. Scale
7. Camera (optional)

Activity, Step 1—Planning
1. The planning phase of the waste audit may take 2-3 days. The better the planning and the more knowledgeable the students and support staff, the better the project.
2. Lead a discussion with the students addressing what an audit is and its purpose.
3. Ask students to identify areas where trash is generated cafeteria, school office, classrooms, etc. Have students agree upon what would be a representative sample of trash from your school. The larger the sample, the more accurate your results will be. Collect samples at the end of the day and analyze it the next (with the exception of food waste which should be weighed on the same day and discarded).
4. Ask students to coordinate waste audit with the custodial service, food service staff (if including food waste), office personnel, and classrooms. Have students think about the most effec-

Things to consider before you begin:

- Have students help the food service staff make sure that the wet waste generated from the cafeteria is separated from the dry waste.
- Have students announce the activity to the student body. Asking everyone to participate will mean a successful audit.
- Caution should be exercised when handling trash. DO NOT sort trash from bathrooms. Ask the students to bring to your attention anything that might be considered a hazard. Stop the audit and dispose of the material properly.

tive way to present the idea such as: visiting individual classrooms, creating and distributing flyers, speaking to a student assembly.
5. Copy and pass out the "Statistics" spreadsheet or ask the class to develop and design their own.
6. Ask the students to weigh the empty garbage cans first and record the weight on the appropriate spreadsheet.
7. Ask the class to divide into teams for collection, sorting, weighing, and analysis.
8. Ask students to devise a plan to keep track of each location where trash is collected.
9. Ask students to devise a plan for disposing of the trash once the waste audit is finished.

Activity, Step 2—Collecting, Sorting, Weighing

1. Ask the collection team to collect trash from pre-designated locations, keeping record of the location where each sample was collected.
2. Ask students to weigh the can containing the "wet waste," subtract the weight of the empty can and record this weight. This should be done soon after lunch or right after school, the same day the "wet waste" is collected.
3. Ask students to spread the protective covering on the floor and (wearing gloves) empty the contents of the dry waste container.
4. Ask the students to separate dry waste into categories: recyclable paper, aluminum cans, glass, plastic, and "other" waste. Other waste is used paper from the kitchen, facial tissue, candy wrappers, and anything that does not fit into the other categories. Remember, do not include bathroom waste in your audit. Consider photographing the mounds of separated trash. Pictures are a powerful tool that can be used when sharing the results with the rest of the student body and staff.
5. Ask students to weigh each separate category by placing one category at a time into the preweighed container. Subtract the weight of the container and record results.
6. Once all results are recorded, ask students to dispose of trash according to their previously developed plan.
7. Copy and pass out "What's in Your Trash" student page. Use these questions to lead a discussion about what could/should be done to reduce the school's waste. Talk about advantages and disadvantages to a recycling or compost program (see below for student page suggestions).

Activity, Step 3—Field Trip/Speakers (optional)

1. Consider planning a field trip to the local landfill, waste-to-energy plant or recycling facility to see what happens to the trash once it is collected.
2. Invite representatives from the local Solid Waste Authority or the county's recycling coordinator to speak about what's happening in their county and local communities to deal with solid waste issues.
3. Ask the students to brainstorm questions beforehand.

Student Page Suggestions

1. Posters and graphs can be hung near trash or recycling containers. Written reports can be included in the school's newsletter or the class might choose to speak to individual classes or an assembly of the participating student body and staff. Consider a combination of ideas to convey the message to a more diverse population of the school.
3. See activity "How Should We Use Our Natural Resources."
4. See activity "What is Recycling and Waste Management? Really…"
5. Reasons include: consumer safety, attractiveness (makes people want to buy one item instead of another), to protect the item being sold, etc.
6. Do you: bring your lunch in reusable containers, write or make copies on both sides of paper, send messages electronically?
9. Develop a school wide recycling program. See activity **Do the Right Thing… Recycle**.

What's in Your Trash?

Classroom Waste Audit

1. Decide how you want to convey the results of your waste audit. Think about the most effective way to share your data—visually, orally, written report, etc.
2. What items did you find the most of? Where was this waste generated? Is this item recyclable?
3. What items did you find the most of? Where was this waste generated? Is this item recyclable?
4. What other items found in the audit can be recycled or reused?
5. How much of the weight comes from packaging materials? What are some reasons for this packaging? Can you think of some alternative to this kind of packaging?
6. How can you, personally, reduce the amount of waste at your school?
7. Implement your results by developing a flyer or posters that show what students can do to reduce their waste.
8. Develop strategies to change both student and teacher behavior to reduce waste.
9. Conduct additional waste audits monthly, quarterly, or twice a year to monitor the progress in the school's waste reduction.
10. If there is a reduction in waste hauling services, work with your school's administrators to develop a plan for using the money that is saved.

Waste Audit Statistics

Waste from:	Weight of empty garbage can	Weight Paper	Weight Aluminum Cans	Weight Glass	Weight Plastic	Weight Other Waste	Weight Wet Waste
All 5th grade classrooms							
All 6th grade classrooms							
All 7th grade classrooms							
Administrative Offices							
Cafeteria							
TOTAL WEIGHT (lbs)							

Use this form or create your own. You might choose to audit just one grade or selected classrooms.

Do The Right Thing… Recycle

School Wide Recycling Program

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7. Renewable and Nonrenewable Resources

B. Describe the role of recycling and waste management.

- Identify materials that can be recycled in the community.
- Describe methods that could be used to reuse materials for new products.

Other Academic Areas:
Reading, Writing, Speaking, Listening
Family and Consumer Science
Science and Technology

Recommended Level: Intermediate
Objectives:
The purpose of this activity is to introduce the benefits of recycling and develop a student run recycling program.

The Students will:
1. Identify commonly used items and create effective recycling solutions.
2. Understand why recycling can be an effective way to minimize the amount of waste going to landfills.

Materials:
1. Access to the Internet (if available)
2. Phone access and telephone book
3. Library
4. Transportation for field trip

Activity, Step 1—Discussion
1. Lead a discussion with the students about why recycling is important. Ask the students to research the history and benefits of recycling.
2. Each school is mandated to recycle. Ask the students to find out if your school has a recycling policy and if any items are currently recycled.
3. Ask the students how a recycling program could benefit the school.
    - Saving money by avoiding disposal costs.
    - Improving the school's image and morale by "doing the right thing."
    - Earning money by selling aluminum.
    - Setting a positive example that will help students educate their families.

Activity, Step 2—Communicating the idea/Generating support
1. Widely communicating the plans for a recycling program will increase the chances of its success.
2. Ask the students to communicate the plans for a school wide recycling program to the entire student body, office staff, teach-

Things to consider before you begin:

- Conducting the community investigation in the activity, **What is recycling? Really…**, will help the students discover their local recycling options.
- The school wide recycling program can be performed independently or in conjunction with the Classroom Waste Audit.
- Ask students to meet with the school principal, administrative support staff, teachers and the custodial service to present the project and explain that a successful recycling program must be a group effort. Keep everyone in the loop so there are no surprises!

ers, and the custodial service. Have the students think about the most effective way to present the idea and generate enthusiasm — posters, article in the school's newsletter, assembly. Ask the students to research interesting recycling facts (have them type the words "recycling facts" in the search space of their favorite search engine.) Distribute "fact sheets" to the student body.

3. If students identify materials that aren't recyclable, ask them to brainstorm ways to prevent them from being thrown away in the first place or to think of creative ways to reuse items that are usually discarded. Visit **www.pacleanways.org/kids**, for crafts made out of recycled items.
4. Ask the students to interview the custodial service and have them ask for input and thoughts on creating a recycling program. They might not have the extra time or money in the budget to oversee the program and would welcome the help of the students program that would complement what they already do. Stress to the staff that this will be a **student run project**.

Activity, Step 3—Choosing an item to recycle

1. If the students have completed a school wide waste audit, have them use the results to help determine what materials to target for the recycling program. Or ask the students to visually assess the school's waste stream for materials that can be recycled but currently are not. The most commonly targeted materials are paper, cardboard, cans, and bottles.
2. Ask the students to research how different recyclables are used and what, if any, local businesses would benefit from the school-wide recycling program. Farmers will often take newspaper that they shred and use as bedding for their animals. Ask students to explore the sale of recycled items such as aluminum cans. Encourage them to list ways money generated from the program (if any) can be used (field trip to a recycling facility or local landfill or have a pizza party to celebrate the successful recycling program). Other items, such as computer terminals and monitors, are now being recycled, too. This is called e-cycling.
3. To ensure a successful recycling program, ask the students to choose one item that is most common in the school's waste stream. Once the program is working well, they can always add recycling programs for other materials. Build a comprehensive program in phases.

Activity, Step 4—Selecting a Vendor

1. Ask the students to research local recycling vendors (may be as easy as asking the school's waste hauler if they take recyclables). If students are adding to an existing recycling program, you might need to use multiple vendors. The county's recycling coordinator might be able to supply a listing of vendors.
2. Have students make a list of pros and cons for each vendor before selecting one to work with. Does the recycling vendor you are working with provide a pick-up service or do they require the materials to be dropped off? If the materials are going to be picked up, are they required to be prepared or packaged in a particular way?
3. Ask the students to develop a plan. Determine how often recyclables will be collected and by whom. An overflowing recycling bin means these items will end up in the trash.
4. Ask the students to develop a way to keep track of student responsibilities by creating a "chart of responsibility" that states when recyclables will be picked up and whose turn it is to prepare them for pick up, etc. Rotate responsibilities. Develop a training process so that new volunteers will know what to do.

Activity, Step 5—Recycling Containers and Location

1. Ask the students to brainstorm who to contact to get recycling containers free of charge such as the local recycling coordinator, local businesses or municipalities.
2. An alternative is to have students make their own. Students could hold a fundraiser to generate the money needed to purchase containers or they could ask local businesses to donate large trash containers with lids.
    - Suggestions: Punch a hole in each lid and decorate the containers to make them stand out from the waste cans. Be sure to clearly label the containers to show what items are to be placed in them. If the students are approaching a local business to ask for recycling containers, such as the local hardware store or home builders supply, have them

draft a letter explaining the project. Be sure to let the businesses know they will be kept up-to-date on the program's success.

3. Ask the students to take a walk around the school and scope out obvious locations for placement of recycling containers. Recycling containers should be placed where the materials are generated. For example, if students choose to recycle aluminum cans, it would make sense to place a container in the cafeteria or beside vending machines. If students choose to recycle office paper, containers should be placed next to copy and printing machines. A good rule of thumb is to place a recycling container next to each trash can.
    - Things for students to think about: remember to label the containers to avoid any confusion, place recycling containers in centralized locations with easy access, be sure to involve the custodial service in this decision. Explain how the recycling program will reduce their work by reducing the overall amount of waste generated.

Activity, Step 6—Create a Maintenance Plan

1. Ask the students to create a plan for emptying the recycling containers and keeping them clean. Work with custodians to determine how cans, bottles or paper needs to be prepared for the vendor and where it needs to be placed for pick up. Rotate the schedule so everyone gets a turn at different jobs.
2. Have the students include in their plan a regular "check in" with organizers, custodians and vendors to see how the program is working. The containers might need to be emptied more often, the location of the containers might need to be adjusted or more containers might be needed in one location and less in another.

Activity, Step 7—Determining Your Success

1. Copy and hand out the student page. Decide, as a class, how you will determine the success of your recycling program.

Activity, Step 8—Field Trip/Speakers

1. Does your county have a recycling coordinator? If so, ask them to speak to your class or ask if students can visit them with some questions. Have students prepare questions, as a class assignment before the meeting.
2. Arrange to tour a recycling facility to see what happens to recyclables once they have been picked up or dropped off.

Determining Your Success

1. Determine how you will know if you were successful. If you began this project by performing a waste audit, will you perform another one in 3 months? Six months?

2. Ask for tonnage or volume reports from the recycler/garbage hauler.

3. Quantify the success of your recycling program by determining the amount of resources saved, pollution prevented or dollars saved (or earned). Create a chart that will help others become aware of the benefits of recycling.

4. Keep track of student volunteer hours to show how much time and salary was saved. Present this information to the administration, student body and school board. For Independent Sector value of a volunteer's time go to **www.independentsector.org/programs/research/volunteer_time.html**.

5. Design a forum to discuss recommendations and ideas for improving or expanding the program with the students, teachers and staff. Did you have full cooperation of the student body and staff? If not, what incentives could encourage participation?

6. Has there been a change in attitude toward "throw away" behaviors? Do you think these changes are directly related to the school's recycling program? Explain.

7. How can the school further reduce the amount of waste that is thrown away?
    - Interview the cafeteria management. If "throw away" utensils and trays are used, ask them why. Ask them to support your recycling program by using items that can be reused.

8. Communicate your success. Give periodic updates on the recycling program in the school's newspaper or create a bulletin board.

9. Recognize the efforts of the staff, student body and local businesses. Remember to thank all those involved. If a local business donated containers for your program, write them a thank you note. Include a photo of the recycling program "in action."

10. What have you learned from this project? What would you do differently next time? Did you encounter any obstacles?

Renewable and Nonrenewable Resources

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.2.7 Renewable and Nonrenewable Resources

A. Know that raw materials come from natural resources.

- Identify resources used to provide humans with energy, food, housing and water.
- Explain how plants and animals may be classified as natural resources.
- Compare means of growing or acquiring food.
- Identify fiber and other raw materials used in clothing and shelter production.
- Identify types of minerals and fossil fuels used by humans.

B. Examine the renewability of resources.

- Identify renewable resources and describe their uses.
- Identify nonrenewable resources and describe their uses.
- Compare finished products to their original raw material.
- Identify the waste derived from the use of renewable and nonrenewable resources.
- Determine how consumption may impact the availability of resources.
- Compare the time spans of renewability for fossil fuels and alternative fuels.

C. Explain natural resource distribution.

- Distinguish between readily available and less accessible resources.
- Identify the locations of different concentrations of fossil fuels and mineral resources.
- Analyze the effects of management practices on air, land and water in forestry, agriculture, fisheries, wildlife, mining and food and fiber production that is unique to different climates.

Other Academic Areas:
Reading, Writing, Speaking and Listening
Geography
Economics
Technological Devices

Recommended Level: Intermediate
Objective: The purpose of this project is to reinforce and expand on what the students know about recycling and renewable and non-renewable resources.

Students will:
1. Identify raw materials and resources that provide humans with energy, food, housing and water.
2. Examine and compare the renewabilty of resources.
3. Use maps to locate concentrations of resources and understand the effects of management practices of resources.

Materials:
1. Access to the Internet (if available)
2. Access to a library
3. Resource maps for the world, United States, Pennsylvania
4. Rock and Mineral Field Guide or encyclopedia.

Activity, Step 1—Plants and Animals as Natural Resources

1. Discuss how plants and animals can serve as natural resources. Plants that provide food (vegetables, fruit, grains) can be considered natural resources. Some plants provide fiber for textiles (cotton, linen) or materials for shelter and furniture (timber). Animals also provide materials for food and clothing, as well as other things we use.
2. Give the students 5 minutes to list all of the things that humans get from plants and animals. Remind them to consider plants and animals that are found in bodies of water. Use chart paper or the board to record their answers. Are there any answers that the students find surprising?
3. Discuss the ways humans acquire food. Most food comes from large-scale farming operations. Consider these questions:
    - Have humans always used farms to get their food?
    - How did humans get food before farming? *(Hunting and gathering.*)
    - How does farming affect resources like soil and water? *(Plowing soil leaves it exposed to erosion—valuable topsoil as well as other layers of soil can be lost to erosion. Soil erosion can cause water pollution when rain washes soil into surface water. Water wells can go dry if used for irrigation. Chemicals like fertilizer and herbicides can pollute surface water and groundwater.)*

Activity, Step 2—Identifying Natural Resources

1. Copy and introduce the student page to the students. Ask them to complete the list, noting the resources used to make each product listed. Encourage the students to look for more than one answer for each item. Next, ask them what resources are used in the manufacturing, packaging and transportation of these items to where they are used.

Activity, Step 3—Minerals and Fossil Fuel

1. Ask the class to define ***mineral*** and ***fossil fuel***.

    Mineral— a naturally occurring substance (as ore, petroleum, or water) obtained usually from the ground.

    Fossil fuel—a fuel (as coal, oil or natural gas) that is formed in the earth from plant or animal remains.
2. Introduce a discussion on how humans acquire minerals and fossil fuels. Are they readily available? If an industry needs a large quantity of a particular mineral, is it likely for the mineral to be lying out in the open ready to collect and use? What happens to the resources before they are ready to use?
    - Minerals and fossil fuels often need to be **refined** before they are used. **Ores** contain an **element**, for example, **iron ore** is mined for the iron it contains. The same goes for **aluminum ore**.

        Ore—a mineral mined to obtain a substance that it contains <iron *ore*>

        Element—one of the parts of which something is made up

        Refine—to come or bring to a pure state
3. Have students use a Rock and Mineral Field Guide, encyclopedia or the Internet to find out the names of specific ores.

Activity, Step 4—Renewablity of Resources

1. Ask the students about how many forms of energy they are familiar with. Contact your local utilities company and ask if they have a fact sheet you can use for this activity.
    - How are their homes heated?
    - What powers lights, televisions and computers in their homes?
    - What powers their families' cars?
    - What resources are used to make electricity?
2. Ask students to define **renewable** and **nonrenewable** and give examples of each.
    - **Renewable**—capable of being replaced by natural ecological cycles or sound management procedures <*renewable* resources like water, wildlife, forests, and grasslands>

- **Nonrenewable**—not renewable; *especially* **:** not restored or replaced by natural processes <*nonrenewable* resources>

Renewable	Nonrenewable
Solar	Coal
Water	Oil and Gas
Wind	Nuclear

3. Lead a discussion on ways to conserve nonrenewable resources. Visit "What's Energy" on the U.S. Department of Energy's website at **www.eia.doe.gov/kids/energyfacts/sources/whatsenergy.html**.
    - Walking when you can.
    - Turning off lights, television, computer, ceiling fan when not in use.
    - Turning down the thermostat.

Activity, Step 5—Changes from raw material to product

1. Ask the students to research aluminum, iron ore, and quartz (use a Rock and Mineral Field Guide, encyclopedia or the Internet.) Have the students compare raw materials with finished products, using pictures to illustrate the difference. The chart below shows some of the raw materials used to produce cans, glass, etc.

Raw Material	Resource	Finished Product
Bauxite, Diaspore	Aluminum	Aluminum can, Aluminum foil
Hematite, Magnetite	Iron	Steel can, Cast Iron Cookware, Automobile Bodies
Quartzite, Trona, Kernite	Sand, Soda Ash (Sodium Carbonate)	Glass

2. Have students or student teams research the manufacturing process of a finished product.
    - What materials are needed?
    - How are the raw materials converted into the product?
    - What are some of the by-products and waste generated during the manufacturing process?
    - Can the finished product be recycled instead of thrown away after using it?
    - Can the finished product be converted back into the original raw materials?
    - How can recycling conserve the raw materials?
3. Have the students take the information they researched and make a flow chart illustrating the manufacturing process from start to finish. Have them share it with the class.

Activity, Step 6—Effects of Resource Consumption

1. Ask the students if they can remember a time when their communities were required to conserve water.
    - What were the reasons to conserve *(drought, pollution, mechanical troubles at the treat-*

ment plant)?
- Was the conservation order VOLUNTARY or MANDATORY?
- What were some of the ways their families conserved water *(no car washing, lawn watering)?*
- What might happen if the community did not follow the conservation order (restricted water use, higher rates for water, citations and fines)?

2. Ask the students to go to **www.ghosttowns.com/states/pa/pa.html** to learn about some Pennsylvania towns that stopped thriving because coal and timber resources were exhausted. Have each student write about a particular town and present their findings to the class.

Activity, Step 7—Availability of Resources

1. Ask the students to use the list of resources from **Activity, Step 2—Identifying Natural Resources**, to determine the resources that are the easiest for humans to get, and which ones require more effort to obtain. Ask the students what methods people use to get natural resources. There may be more than one answer for each resource. The students can make a chart freehand (on paper or on the board) or by using a computer program. Use the following chart as a

Resource	Availability	Methods of Obtaining	Special considerations
Water	Readily	Use directly from body of water; well; build dam; pumps	Drought; pollution
Timber	Readily	Cut	Steep terrain; stabilization of site after removing timber; replanting.
Coal	Not Readily	Deep mining; strip mining	Requires extensive planning; requires mechanical tools and machines; safety; site restoration.

Activity, Step 8—Distribution of Resources

1. Using resources maps of the World and/or the United States, have the students identify locations where mineral resources and fossil fuels are found. Are there places where minerals and fossil fuels are both found? Ask the students or student teams to research and identify industries that are located near natural resources sites. Also, research specific management practices on air, land and water for the resource and location the industries chose. This can be typed or written in a short report and presented to the class.
2. **Mapping project**: Copy and pass out the map of Pennsylvania (attached) that shows population densities (major cities) and county boundaries. Have the students map the locations of mineral and fossil fuel resources. The map should include a coded legend. They should also include a point showing their community's location on the map and reference it in the legend.

		RESOURCES USED FOR		
PRODUCT	**RAW PRODUCTS USED TO PRODUCE**	**MANUFACTURING**	**PACKAGING**	**TRANSPORTATION**
orange juice	Oranges, water	Steel (equipment), Oil (to run equip-ment)	Glass, waxed cardboard, oil (for plastics)	Gas, steel, rubber, oil
milk				
shoes				
sweater				
bricks				
electricity				
gasoline				
bread				
baseball bat				
2 litter bottle				
bag of potato chips				
baseball				
car tires				
swimming pool				
light bulb				
house				
CD player				

MAP

Everything… Including the Kitchen Sink
Pollutant Identification

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.3.7 Environmental Health

B. Describe how human actions affect the health of the environment.

- Identify residential and industrial sources of pollution and their effects on the environment.

4.8.7 Humans and the Environment

C. Explain how human activities may affect local, regional, and national environments.

- Explain how a particular human activity has changed the local area over the years.

Other Academic Areas:
Watersheds and wetlands
Reading, Writing, Speaking and Listening
Science and Technology
Civics and Government

Recommended Level: Intermediate
Objectives:
The purpose of this activity is to introduce students to the act of illegal dumping and what affect it has on the environment, humans, animals, fish and birds.

Students will:
1. Understand that individual actions/choices have a large impact overall.
2. Explore disposal options available.
3. Identify pollutants and understand how they can adversely affect the environment.
4. Explore diseases associated with illegally disposed trash.

Materials:
1. Phone access and telephone book
2. Access to the Internet (if available)
3. Provided survey form, pens, clipboard
4. Transportation to dumpsite
5. Camera (optional)

Activity, Step 1—Locate an illegal dumpsite
1. Illegal dumping almost always occurs in remote, isolated, and abandoned areas. In rural areas, trash is often thrown over hillsides completely out of view of passing motorists. In urban areas, trash can be found in vacant lots, parks and abandoned buildings. Lead a discussion with the class around why they think dumping occurs mostly in these types of areas. Keep a list and compare answers to the same questions after visiting a dumpsite.
2. Ask the students to contact local government agencies such as the Conservation District, Department of Environmental Protection or a local affiliate of Keep Pennsylvania Beautiful for help on locating an illegal dumpsite in your area.

Activity, Step 2—Behavior and Safety at the dumpsite
1. Illegal dumpsites can be dangerous places. Hazards include broken glass, protruding nails and other sharp objects, rodents,

Things to consider before you begin:
- Remember to get parental permission before going to an illegal dumpsite.
- Since trash is most visible before leaves begin to appear, early spring is an ideal time for this activity.
- Be aware of the hazards that exist at illegal dumpsites (broken glass, hypodermic needles, rusty appliances, etc.) Be prepared.
- It is critical that everyone wear long pants, a long sleeve shirt, and sturdy boots (with a thick sole).

snakes and biting insects. Communicate to the students ahead of time to wear long pants, a long sleeve shirt and sturdy boots. Have insect repellent, a first aid kit, emergency phone number and communication device with you. Ask the students to remain on the perimeter of the site and never go to an illegal dumpsite alone.

2. Remember that this is an observation, NOT a cleanup. Students should NOT HANDLE any of the illegally dumped items.

Activity, Step 3—Planning a field trip to an illegal dumpsite

1. Contact your local enforcement officials or affiliate of Keep Pennsylvania Beautiful and ask if they could accompany the group to the dumpsite or meet you there.
2. Consider inviting the media. The local media (newspaper, television) is a great tool that can help inform the public of the problem of illegal dumping. Ask the students to "practice" their invitation skills before inviting the media to accompany them on the field trip. Once they are comfortable, they can use a local phone book or the Internet to get media contact information.
3. Ask the students to brainstorm what kinds of pollutants they think will be found and how the pollutants might affect humans, animals, fish, birds and the environment. Keep a list and compare answers to what students find at the dumpsite.
4. Review the attached survey form with the students ahead of time. Have each student take a survey form and clipboard or work in groups. Have each group record a specific kind of trash. Trash found may include: tires, appliances, daily household trash or yard waste. Students could also describe the terrain and why they think this site is dumped on, etc.
    - Ask students to document what they see. Photos show the problem first hand and can be a valuable tool if approaching local officials.

Activity, Step 4—After Illegal Dumpsite Visit Discussion

1. Lead a discussion with the students about why they think people illegally dump garbage.
    - It's cheaper than paying for disposal, it's convenient, they don't know that alternatives exist, they don't care, etc.
2. Discuss the location of the dumpsite you visited. Was it rural or urban? Was it in a remote area? Over a hill? Near water? In a vacant lot or abandoned building? Ask the students why they think this place was chosen to dump trash. Are their answers different after visiting an illegal dumpsite?
    - Usually dumping occurs in out of the way places where the chance of getting caught is not as great. Convenience of location (for the dumper) is also a factor. If dumping occurs over a hillside, it makes the trash less visible to passing traffic or pedestrians. In urban areas, vacant lots, abandoned buildings or dead end roads are common dumping grounds because it appears as if no one cares for those areas.
3. Ask the students to research why/how dumping can affect water quality, animals, birds, fish, and humans.
    - Freon-containing appliances, old, leaky oil containers, dirty diapers, antifreeze, treated lumber (lumber is treated with arsenic), rusty metal, old household or industrial strength cleansers, chemicals and medical waste can directly contribute to ground and surface water contamination, soil contamination and loss of habitat for both humans and animals. Runoff from sites where chemicals, daily trash and other items are dumped can contaminate wells and surface water which eventually end up in our drinking water.
4. Many people think that dumping grass and tree clippings is acceptable because it is natural and will decompose. Ask the students to think of reasons why yard waste should not be dumped. What would be a better way to dispose of yard waste?
    - When trash is dumped illegally, even biodegradable yard waste, it can and usually does attract other trash. It sends the message that it is OK to dump your trash here. In other words, trash attracts trash!
    - Sometimes yard clippings are put into plastic bags before they are dumped illegally. The bags don't allow the clippings to decompose. This, too, attracts more trash.

- Yard waste can be composted in your own backyard. Some municipalities offer a collection or drop-off service where it is then taken to a centralized compost center.

5. Discuss the problems associated with dumped tires.
    - Tires provide ideal breeding sites for mosquitoes that carry a disease known as West Nile virus. To learn more about West Nile virus go to **your favorite search engine and type in West Nile Virus.**
    - Tire piles are a fire hazard and burning tire piles can threaten air quality.
6. What other problems can be associated with illegal dumping?
    - Illegal dumpsites can be "hot spots" for other illegal activity.
    - It's unattractive
    - Decreases property values and community pride
    - Might deter individuals from moving to the area or establishing a business
    - Might deter individuals form visiting the area
7. Ask the students how they think dumping could be deterred or stopped.
    - Placing large boulders, earth mounds or a guide rail at the site to block access
    - Returning the area to its natural beauty by planting trees or grass (beautification)
    - Monitoring the area on a regular basis
    - Educating the community about the negative effects of illegal dumping
8. Have the class decide what to do with the information you gathered. The students can speak to the county commissioners and share the group's concerns about illegal dumping. The students can use the attached sample questions to help them prepare a presentation.
9. Ask the students to write about what they learned by participating in this activity including how it made them feel to see an illegal dump
    - Did this activity change your thinking about protecting the environment?

Activity, Step 5—Speakers/Additional Activities

1. If there is a local affiliate of Keep Pennsylvania Beautiful in your area, invite them to speak to the class about littering and illegal dumping. Visit www.keeppabeautiful.org to find out where affiliates are located.
2. Invite your county's West Nile virus coordinator to speak to the class.
3. Visit the Keep Pennsylvania Beautiful website to see if there are any illegal dump cleanups in your area. Volunteer to participate.

Presentation of Problem to Local Officials

Share the illegal dumpsite visit:

- Remember to use visual aids (charts, graphs, photos) to show the problem.
- Discuss the contaminants found and their threat to the environment.
- Create a flyer or handout that folks can take with them as a reminder of the information presented.
- Let them know that you want to help solve the problem.
- Ask for and agree on an action step to ensure the issue does not become "dead in the water."

Consider asking your local officials these questions:

1. Who is responsible for waste disposal, recycling and waste prevention in our community?

2. What options do residents have for waste disposal?
    - Is there mandatory trash collection in our community and is it required by law that homeowners pay for trash collection?
    - Is trash collected by municipalities or private haulers?
    - Are recycled items picked up at residents homes? If not, are drop-off sites available and convenient to all residents?
    - Does the community operate or fund a composting facility for grass, leaves, food scraps and other types of organic materials?

3. What goals have been set for waste generation, disposal, recycling and waste prevention (state or municipal)?
    - What is used to measure the progress or success of these goals?

4. How does the community educate the public about waste disposal options and recycling opportunities?
    - Are there ad campaigns?
    - Does the community have a resource guide to help steer residents in the right direction?

5. Does the community encourage residents or businesses to reduce the amount of waste generated?

6. Who is responsible for the cleanup of illegal dumpsites?

Illegal Dump Survey

Date_____

Name_____ **Class**_____

Number of Students performing the survey_____

Others in attendance (include affiliation/agency)

_____ _____
_____ _____
_____ _____

Is the dumpsite located on public or private property? (circle one)

Location of dumpsite:

Road/Area name_____

County_____

Municipality (Borough, City, Township)_____

Location of road/General direction to the dump site (include landmarks)

_____
_____
_____

Terrain:
Describe the terrain. Is the garbage over a steep hill? Along the roadside? Near or in the water?_____
_____
_____

Contents of site: What kind of trash do you see? Estimate how much.

Daily household garbage_____ Yard Waste_____

Appliances_____ Tires_____

Beer bottles_____ Vehicle parts_____

Construction Debris_____ Other_____

Estimate the size of area the dumpsite covers (square feet)_____

Why do you think this location was chosen to illegal dump trash?

_____
_____
_____

Name_____ Date_____

Everything… Including the Kitchen Sink
(Illegal Dumping and Solid Waste Laws)

Illegal dumping almost always occurs in remote, isolated and abandoned areas. In rural areas, trash is often thrown over hillsides completely out of view of passing motorists. In urban areas, trash can be found in vacant lots, parks, and abandoned buildings. View the virtual tour and complete the Student Survey and questions below.

1. What would prevent you from littering or illegally dumping?

2. What is the problem with dumped tires?

3. What other problems are associated with illegal dumping?

4. How do you think dumping could be deterred or stopped?

Someone who gets caught littering or dumping trash will probably have to pay a fine. It may be as high as $300. Some agencies can even charge $10 for each piece of trash found. In some instances, a person who dumps trash could have his or her car taken from them, or have to clean up the entire dump, not just the trash they dumped.

Did this activity change the way you feel about protecting the environment? Explain.

_____

_____

_____

_____

_____

Why Are There Laws That Address Solid Waste?

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.9.7 Environmental Laws and Regulations

A. Explain the role of environmental laws and regulations.

- Identify and explain environmental laws and regulations (e.g., Clean Air Act, Clean Water Act, Recycling and Waste Reduction Act, Act 26 on Agricultural Education).
- Explain the role of local and state agencies in enforcing environmental laws and regulations (e.g., Department of Environmental Protection, Department of Agriculture, Game Commission).

Other Academic Areas:
Reading, Writing, Speaking and Listening
Civics and Government
Science and Technology

Recommended Level: 5-7
Objective: The purpose of this project is to introduce environmental laws and the consequences of illegal actions. Students will learn why there are laws about solid waste, what the laws cover, which agencies have regulations and who enforces these laws.

Students will:
1. Identify which Pennsylvania agencies have regulations about solid waste.
2. Identify why these agencies have an interest in solid waste issues.
3. Compare/contrast disposing of trash legally and illegally.
4. Discuss the effects of illegally disposed trash on communities, landforms and wildlife.

Resources:
1. Access to the Internet (if available)
2. Access to a library
3. Phone access and telephone book
4. PA CleanWays enforcement publication, "Working Together to Fight Illegal Dumping." (optional)

Activity, Step 1—Discussion of Solid Waste Laws
1. Talk with your students about why they think there are laws that address solid waste disposal.
2. Ask students to make a list of all the enforcement agencies they can think of and what areas each particular agency addresses.
3. Have the students research the agencies they came up with and encourage them to find out what led up to the creation of each particular agency.

    - Pennsylvania Department of Environmental Protection (DEP) **www.dep.state.pa.us/landrecwaste/site/default.asp** *(for solid waste information)*
    - Pennsylvania Fish and Boat Commission **www.fish.state.pa.us**
    - Pennsylvania Game Commission **www.pgc.state.pa.us**
    - Pennsylvania Department of Conservation and Natural Resources **www.dcnr.state.pa.us**
    - PA State Police **www.psp.state.pa.us**
    - Your local government and/or police department

    PA State Police and your local police department can share information regarding PA Crimes and Vehicle Codes.

If students do not have access to the Internet, they can use the government pages of a local telephone book to contact the agencies directly (see Activity, Step 5—Fieldtrip/Speakers, question 3.) The government section of phone books are divided into sections for Federal, State and Local Governments. The Keep Pennsylvania Beautiful publication "Guidelines for Littering and Illegal Dumping Enforcement" summarizes PA solid waste regulations and each agency's involvement in enforcing solid waste laws. Contact Keep Pennsylvania Beautiful at (724) 836-4121 for a copy.

Activity, Step 2—Discussion of Improperly Disposed Trash

1. Lead a discussion about how improperly disposed trash can affect different occupations, animals and life in both urban and rural areas. Ask the students to brainstorm as many different areas as they can (see examples below). Using their own experiences can help them do this. These places, along with the students' responses, can be written on the blackboard or on chart paper.
    - **a town's business district**—Litter can make a town look dirty, impact property values, reduce community pride, and people may stop doing business there.
    - **a farmer**—Litter can blow into farm fields, damage equipment and can get accidentally baled into hay, costing farmers time and money. Farm animals can ingest litter that can cause illness and death. The term farmers use to describe this illness is "hardware."
    - **a vacant lot**—Litter can accumulate, making others think that it's OK to leave trash there. This reduces community pride and can attract insects or rodents. In urban areas, there are often hazardous materials like used needles.
    - **a highway**—Litter looks ugly, and can blow around the road, possibly causing accidents.
    - **your neighborhood**—Again, litter reduces community pride and can attract people who don't care. People may not want to move to a neighborhood where a lot of litter can be seen; it can reduce property values.
    - **a park**—Families may stop using a park that is littered. Food waste can attract rodents and insects.
    - **a forest, river or other natural area**—Litter can affect wildlife in the same way it can hurt farm animals. Ducks can become tangled in improperly discarded fishing line, or animals can search for food in littered areas and accidentally eat something sharp or poisonous.
2. Encourage the students to think beyond how ugly litter and dumped trash looks. What else does litter/illegal dumping affect? Consider contacting a local wildlife rehabilitator or veterinarian to talk about ill effects litter has on animals (domestic or wild.) Discuss their suggested answers.
3. Have the students share whether they have noticed improperly disposed trash, along with the effects, in any of these places. Would a "trashed" location influence their desire to spend any time in these places?
4. Ask the students why they think people litter or illegally dump larger quantities of trash. Is it because…
    - People don't know any better—their family has been doing it this way for years?
    - There aren't any alternatives — They don't have home garbage collection?
    - It's easy—the illegal dump is right on the way home from work?
    - It's cheaper than paying someone to haul it away to a sanitary landfill?
    - People don't care?

Activity, Step 3—Act 101

1. Ask the students to research Act 101 and summarize the law (**www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/FACTS/Act101.htm**).
2. Lead a discussion about Act 101.
    - Are households and business required to use licensed garbage haulers to dispose of trash?
    - Is our school mandated to recycle?
    - Does our school meet Act 101 requirements?
    - What factors dictate if a municipality is required to recycle?
    - Is your municipality required to recycle?
    - What materials can be recycled?
    - How many materials are municipalities required to recycle?
3. Can you think of other ways to recycle? What do you do with you food scraps and lawn clippings at home? Do you think composting is another way to recycle? What are you recycling and what is the end product?
4. Consider implementing a small recycling effort in your school at this time. Or if your school is re-

cycling, expand the program. (See 'What is Recycling' or 'Do the Right Thing...Recycle')

Activity, Step 4—Consequences of Improper Disposal

1. Lead a discussion about what happens when someone gets caught littering or dumping illegally. Use the following scenario to initiate a discussion about the penalties of illegal dumping and littering. The ideas discussed here could serve as an introduction to the activity on the following page.
    - Someone who gets caught littering or dumping trash will probably have to pay a fine. It may be as high as $300. Some agencies can even charge $10 for each piece of trash found! In some instances, a person who dumps trash could have his or her car taken from them or have to clean up the entire dump, not just the trash they dumped.
2. Ask the students what would prevent them from littering or illegally dumping trash. Ask the students to conduct a survey of the student body, friends or family about littering and illegal dumping. A sample questionnaire is included. Have the students add some of their own questions.
3. As a class, review the responses to the questionnaire. Ask the students:
    - What responses surprised you the most?
    - Do you see a difference in habits between the older and younger generation?
    - What did you find to be the most common attitude about littering and illegal dumping?
4. Ask the students to choose a writing activity from the list below.
    - Write a newspaper article highlighting the problem of illegal dumping
    - Create an interview with either the builder or Bub
    - Pretend you're a wildlife buff, a property owner, or water specialist and write an article expressing your concerns about how this impacts the things you care about.

Activity, Step 5—Field Trip/Speakers (optional)

1. Consider planning a field trip to an illegal dump site to get a sense of how litter and illegal dumping affects the trees, plants, and animal and human population. Ask the students to write an essay about what they saw, how it made them feel and what they think could/should be done about it.
2. Invite representatives from various enforcement agencies to speak about what area of the law they enforce and their experiences with littering and illegal dumping.
3. Ask the student to brainstorm questions to ask the representatives beforehand (see examples below).
    - Does your agency enforce laws that cover littering, illegal dumping or other solid waste issues?
    - What is the specific law your agency uses for solid waste issues?
    - What is the primary solid waste issue your agency is interested in?
    - What are the penalties for breaking these laws?
    - What penalty is more common—imprisonment or fines?
    - How frequently do you cite people for breaking these laws?
    - How do you find out about people who break these laws?
4. If a representative is unable to visit your classroom, ask the students to develop and mail a questionnaire to the enforcement agencies covered in this activity. Based on the responses from each agency, student teams could prepare a presentation, spoken or graphic, to share with the rest of the class (each team could be assigned two agencies).

ACT 101 Background Information
Pennsylvania's Municipal Waste Planning, Recycling and Waste Reduction Act - Act of July 1988

Purpose: Act 101 mandates recycling in Pennsylvania's larger municipalities, requires counties to develop municipal waste management plans, and provides for grants to offset expenses.

Goals: To reduce Pennsylvania's municipal waste generation: recycle at least 25% of waste generated; procure and use recycled and recyclable materials in state government agencies; and educate the public as to the benefits of recycling and waste reduction.

Benefits: Reduced pollution risks; conservation of natural resources, energy and landfill space; and reduced disposal costs.

Recycling

Act 101 mandated municipalities with populations of at least 10,000 to implement curbside recycling programs by September 26, 1990. Municipalities with populations between 5,000 and 10,000 and more than 300 persons per square mile were mandated to implement curbside recycling programs by September 26, 1991.

Mandated municipalities are required to collect at least 3 of the following materials: clear glass; colored glass; plastics; aluminum; steel and bimetallic cans; high grade office paper; corrugated paper and newsprint.

Commercial, municipal and institutional establishments within a mandated municipality are required to recycle aluminum, high-grade office paper and corrugated paper in addition to other materials chosen by the municipality.

Leaf Waste and Composting

Mandated municipalities are required to separate leaf waste from other municipal wastes. Since September 26, 1990, no waste disposal facility accepts shipments comprised primarily of leaf wastes unless a separate composting facility has been provided.

Recycling Lead and Acid Batteries

Act 101 makes it illegal to discard automotive and other lead acid batteries. These batteries must be recycled through (1) an automotive battery retailer or wholesaler, (2) a secondary lead smelter permitted by the U.S. Environmental Protection Agency, (3) a collection or recycling facility authorized to accept them. In both retail and wholesale outlets, customers must be able to recycle at least the same number of used batteries as the number of new ones purchased.

Household Hazardous Waste (HHW)

Household hazardous waste is comprised of household products that are either reactive when mixed with other products, corrosive, flammable, or poisonous. Act 101 encourages HHW collection programs to ensure recycling or safe disposal of these wastes, and requires program sponsors to register with DEP.

Waste Reduction

Pennsylvania citizens are encouraged to help reduce waste by purchasing products that are durable, repairable, recycled, recyclable and/or have minimal packaging, and to find other uses for surplus goods instead of throwing them away.

Manufacturers are encouraged to design their products with recycling in mind and assess their processes to minimize discards.

Source: www.dep.state.pa.us/dep/deputate/airwaste/wm/RECYCLE/FACTS/Act101.htm

You're the Boss

Your business, *My Own Remodeling and Landscaping Company* is finishing your first big job, building a second story addition and a garage. You had to remove some bushes and a tree, tear down an existing garage and bulldoze dirt and rock from the site. You wanted to burn the bushes, trees and wood from the garage, but the township doesn't permit open burning. Someone was going to use the bricks from the old garage, but they had paint on them and no one wanted them. Now that the job is finished, you need to remove these materials to finish landscaping the yard.

Bub, who works for another company, *Get It Built Quick*, suggested that you use the place he throws out his leftover materials. Bub gave you directions to the dump he uses. It is along a gravel road, on a rocky pull-off next to a swamp. Soil, rocks, wood and concrete block are already dumped here along with a lot of daily household trash, partially covering a "**NO DUMPING**" sign.

1. Should you use the dump that Bub recommended? Why or why not?

2. Since other people are dumping here already, is it OK for you to use this spot, too? Why or why not?

3. Why might this dump be a bad location?

4. OK, so you might not dump the construction debris but dumping the yard waste isn't really 'dumping' because it's natural and will biodegrade, right? Do you agree? Why or why not?

5. Can the plants be reused/composted/mulched/replanted? Can you take them to a landfill?

6. If you dump the construction waste here, and get caught, which agencies could cite you for illegal dumping?

7. If you get caught dumping here, what penalties do you face?

8. What are some things that you can do to get rid of the waste from this job legally? (See **www.constructionjunction.org**.)

9. WHO CAN YOU CALL TO REPORT AN ILLEGAL DUMP?

Bub is convinced that you should dump your supplies along the gravel road. No one has ever been caught and besides that, all of the local contractors use it. Explain why you agree or disagree with him using what you have learned so far.

As you write, be sure to:

- Give specific examples of the effects of dumping.
- Include your own ideas.
- Write neatly and clearly.
- Form well developed paragraphs.

Student Conducted Survey

Age group
Check one: ___ under 8 years old ___ 8-12 years ___ 13-16 years
___16-21 years ___21-35 years ___ 36-55 years
___56-65 years ___ over 65

1. Have you ever witnessed anyone littering? ___ Yes ___ No

2. Have you ever littered? ___ Yes ___ No

3. Is there litter or dumped trash near where you live, go to school, play, or work?___ Yes ___No

4. Have you ever seen an illegal dump site? ___ Yes ___ No

5. If you have seen an illegal dumpsite, how did it make you feel?
_____
_____

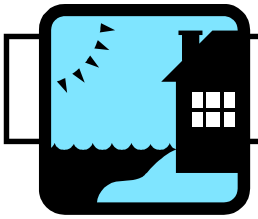
6. Do you think it's wrong to litter or dump your trash over a hillside?
___ Yes ___ No
Why or why not? _____
_____

7. Do you know it that littering and illegal dumping are against the law?
____Yes ___No

8. Would you litter if you knew you wouldn't get caught? ___ Yes ___ No
Why or why not?_____
_____
_____

9. Have you ever picked up someone else's trash? ___ Yes ___ No

10. Do you live in an urban or rural area? ___ Urban ___ Rural



What's a Watershed?

Pennsylvania Department of Education
Academic Standards for Environment and Ecology
4.1.7 Watersheds and Wetlands

A. Explain the role of the water cycle within a watershed.
- Explain the water cycle as it relates to a watershed

B. Understand the role of the watershed.
- Explain how water enters a watershed.
- Explain factors that affect water quality and flow through a watershed.

C. Explain the effects of water on the life of organisms in a watershed.
- Explain how water is necessary for all life.

D. Explain and describe characteristics of a wetland.
- Describe different types of wetlands.
- Describe the different functions of a wetland.

E. Describe the impact of watersheds and wetlands on people.
- Explain the impact of watersheds and wetlands in flood control, wildlife habitats and pollution abatement.

4.3.7 Environmental Health

B. Describe how human actions affect the health of the environment.
- Identify residential and industrial sources of pollution and their effects on the environment.
- Explain the difference between point and nonpoint sources pollution.
- Explain how nonpoint source pollution can affect the water supply and air quality.

Other Academic Areas:
Science and Technology
Reading, Writing, Speaking and Listening

Recommended Level: Intermediate
Objective: The purpose of this activity is for students to understand the role and characteristics of a watershed and the effects of water on organisms in a watershed. They will also be able to describe the impact of watersheds and wetlands on people.

Students will:
1. Learn that we all live in a watershed.
2. Create a watershed model as a way to visualize watershed interactions. Students will visually see the flow of surface water across variety of land contours.
3. Learn that pollutants/contaminants come from a number of sources.
4. Learn the effects of pollutants/contaminants on watersheds.

Materials:
1. Large waterproof tray or tub, or large tray and tarp to protect work surface (if not waterproof).
2. Food coloring or water–based paint and paint brush. Different colors will represent different elements in a watershed.
3. Spray bottle filled with water
4. Small pieces of crumpled scrap paper (to represent solid waste)
5. Foil—shaped to represent differing contours of the land. You can also use crumpled paper towels for this step.
6. Small pieces or strips of sponges (to signify wetlands)
7. Access to the Internet (if available)

**Depending on time and budget, be creative with materials. Cocoa and vegetable oil can be mixed to simulate motor oil. Trees, houses, cars, animals, and other game pieces can be used to bring the watershed to life.*

Activity, Step 1—Discussion, Refer to The Making of a Watershed

1. Lead a discussion about watersheds… we all live in a watershed.
    - Define a watershed. Watersheds are those areas that catch rain and snow and drain to specific bodies of water: marshes, streams, rivers, lakes or ground water.
    - What is ground water?
    - What is runoff? Pollution carried by rain through the watershed to ponds, lakes, rivers, oceans.
    - What is point versus nonpoint source pollution and how do they affect a watershed? Make a list on the board of materials/pollutants that can end up in a watershed.
        - Nonpoint sources include: transportation, agriculture, storm drains, residential areas, construction sites, forestry, etc.
        - Point sources include: industry
    - Do our actions affect watersheds? List some actions and how they could impact a watershed.
    - Who (people/animals) depend on a watershed? In what way?
    - Do watersheds have boundaries? Watersheds come in all shapes and sizes and cross city, county, state and national boundaries.

Activity, Step 2—Building a Watershed Model

Consider having a previously constructed watershed model for the students to use as a template to save class time.

1. Determine if the students will work in groups or pairs. Each group should be encouraged to create a model different from their neighbor to show effects that different land contours have on a watershed.
2. Use the large tray as a base for the various land formations.
3. Demonstrate to the students how the foil can be shaped to represent mountains and valleys and how crumpled pieces of scrap paper can represent solid waste and sponges can represent wetlands. Give the students time to construct their models.
4. Have the students use the water-based paint or food coloring to represent contaminants. Write the color chart on the board...blue represents runoff from paved surfaces, red represents soil erosion, etc.
5. Finally, have each group of students, one at a time, spray the watershed models with water to simulate rainfall.

Activity, Step 3—Observation/Discussion of the Model

1. Have the students observe how the water flows over the surfaces, where the contaminated water collects, and the color of the water before and after it passes through wetlands (sponges) on each model. Lift the sponges to see what contaminants/colors were collected.
2. Lead a discussion about the effects contaminants have on the living organisms and natural resources found in wetlands. Discuss how theses contaminants might be prevented from entering water sources.
3. Have the students write about what they learned from this project.

Activity, Step 4—Research

1. Find out the health of your watershed. Go to **http://cfpub.epa.gov/surf/locate/index.cfm** to locate your watershed.
2. Find out basic laws related to water and watersheds, **http://www.epa.gov/win/law.html**.
3. Research the different ways people use water (rivers) to make a living and how water quality could affect their livelihood.

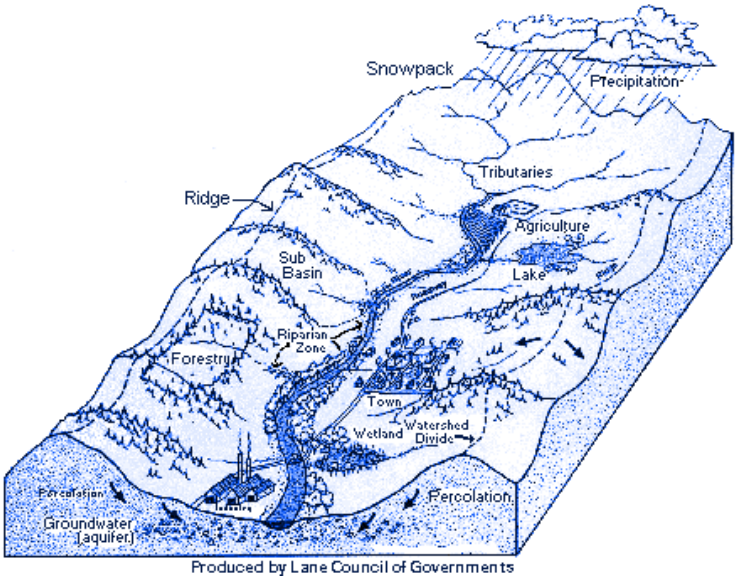
Activity, Step 5—Tour a Watershed/Speakers

1. Contact your local conservation district and invite the watershed specialist to your classroom to talk about you local watershed.
2. There are many virtual tours of watersheds available online:
    - **www.interactivewatersheds.net/uswtrmap.html**
    - **www2.cityofseattle.net/util/tours/CedarRiverTour/slide17.htm**
    - **www.nycwatershed.org/edu_tours.html**
    - **www.psmfc.org/habitat/virtual/tours.html**
    - or type “watershed virtual tour” into your favorite search engine.

The Making of a Watershed

Any time water runs from one place to another it's called a watershed, and we all live in watershed areas. A watershed is a land area from which water drains into a receiving body of water. Receiving bodies of water can include streams, lakes, wetlands, estuaries and groundwater. Watersheds come in different shapes and sizes and local watersheds are subwatersheds (subbasins) of larger, regional ones. The Allegheny River, for example, is a subbasin of the larger Ohio Basin.

Usually, rainwater falls on the ground and soaks in when it rains. When people build neighborhoods, streets and buildings, the rain also falls on what we call "hard surfaces." Those are roofs, driveways, streets, parking lots and even hard compacted ground. The rainwater can't soak into these hard surfaces, so it runs off from the highest point to the lowest. Unlike pollution from factories and sewage plants, <u>nonpoint source pollution</u> is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and even underground sources of drinking water.



<u>NONPOINT SOURCE POLLUTION</u>

- Fertilizers, herbicides and insecticides.
- Oil, grease and toxic chemicals from urban runoff.
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks.
- Dams and concrete channels.
- Salt from irrigation and acid drainage from abandoned mines.
- Bacteria and nutrients from livestock, pet waste and faulty septic systems.

How to Make a Watershed Model Project

Materials

Large Waterproof Tray or Tub
Food Coloring or water-based paint and brush. (Different colors will represent different elements in a watershed).
Spray bottle filled with water
Small pieces of crumbled scrap paper (to represent solid waste)
Coffee grounds (to represent soil and chemicals)
Foil- shaped to represent differing contours of the land. You can also use crumpled paper towels for this step.
Small pieces or strips of sponges (to signify wetlands)
Plant material (leaves, grass clippings, rhododendron leaves)
Small objects to resemble a town (monopoly pieces)

1. Work in groups or pairs. Create a model different from your neighbor to show effects that different land contours have on a watershed.
2. Use the large tray as a base for the various land formations.
3. Place foil mounds to signify mountains and this will also create outlines of a river in the valley.
4. Use plant material to resemble trees in the mountains and tape them to the plastic.
5. Use some other type of material to resemble agricultural crops and tape them to the plastic.
6. Use small objects to resemble a town.
7. Use sponges to represent wetlands.
8. Sprinkle coffee grounds over the watershed to signify soil particles.
9. Now use the water-based paint or food coloring to represent contaminants. Refer to the color key created by your class.
10. Finally, spray water over their watershed model to symbolize rain.
11. Explain what happened to the pollutants.

Name: _____

Date: _____

Building a Structure: Making a Watershed

Category	4	3	2	1
Model Care Taken	Great care taken in construction process so that the structure is neat, attractive, and follows plans accurately.	Construction was careful and accurate for the most part, but 1-2 details could have been refined for more attractive product.	Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.	Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.
Knowledge about real life situation	The student can answer 3 questions correctly about how the model relates to their watershed being studied.	The student can answer 2 questions correctly about how the model relates to their watershed being studied.	The student can answer 1 question correctly about how the model relates to their watershed being studied.	The student does not understand how the model relates to their watershed being studied.
Use of class time	Used time well during each class period. Focused on getting the project done. Never distracted others.	Used time well during each class period. Usually focused on getting the project done and never distracted others.	Used some of the time well during each class period. There was some focus on getting the project done but occasionally distracted others.	Did not use class time to focus on the project OR often distracted others.
Required elements	The model includes all required elements as well as additional information.	All required elements are included on the model.	All but 1 of the required elements is included on the model.	Several required elements were missing.
Working with others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause 'waves' in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team player.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Pennsylvania Manufacturers and Distributors of Recycled Items

Adhesives Research, Inc.
PO Box 100
Glen Rock, PA 17327
717 235-7979
Products Handled:
Label Stock

Aeolian Enterprises
One Lloyd Ave Pl
Latrobe, PA 15650
724 539-9460
www.aeo1.com
Products Handled:
Lumber
Picnic Tables
Chairs

Agrecycle
PO Box 38783
Pittsburgh, PA 15238-8783
Products Handled:
Compost

American Recycled Wood & Pallet
2069 New Castle Road
Portersville, PA 16051
724 368-8099
Products Handled:
Coffins

American Renaissance Paper
33 Rock Hill Road
Bala Cynwyd, PA 19004
610 668-7200, 800 961-3388
www.renpaper.com
Products Handled:
Printing Paper—Copy

American Thermoplastic Company
106 Gamma Dr
Pittsburgh, PA 15238
412 967-0900, 800 245-6600
www.binders.com
Products Handled:
Binders
Clipboards
Report Covers
Tab Indexes

Armstrong World Industries
1507 River Rd
Marietta, PA 17547
717 426-7122

Products Handled:
Tiles—Ceiling

Armstrong World Industries
PO Box 3001
Lancaster, PA 17604
717 397-0611
Products Handled:
Tiles—Floor

BJM Industries, Inc.
RD 1, Box 257-A
Kittanning, PA 16201
724 548-2440
www.nb.net/~bjm
Products Handled:
Lumber

Black Rhino Recycling
4503 Lebanon Church Road
West Mifflin, PA 15122
412 460-0160
Products Handled:
Lumber

Bristol Pipe
88 Newport Road
Leola, PA 17540
717 656-2526
www.bristolpipe.com
Products Handled:
Pipe

Carlisle Tire & Wheel Co. D/B/A Playguard & Softpa
PO Box 99
Carlisle, PA 17013
800 851-4746
www.carlisletire.com
Products Handled:
Mats—Exercise
Mats—Fatigue
Mats—Golf
Mats—Hockey
Surfacing—Playground

Cedar Hollow Recycling
100 Paradise St
Phoenixville, PA 19460
610 983-0193
Products Handled:
Aggregate Base Materials

Coffee Vest Co.
407 Emerson Ave
Pittsburgh, PA 15215
412 782-1428
www.coffeevest.com
Products Handled:
Bags—Tote
Books, Journal
Clothing—Ties
Clothing—Vests
Purses

Confab Corporation
601 Allendale Road
King of Prussia, PA 19406
610 687-5100
Products Handled:
Diapers

Connelly Container
Righters Ferry Rd
Bala Cynwyd, PA 19004
610 617-0600
Products Handled:
Corrugating Medium

Cougle's Recycling Inc.
1000 S 4th St
Hamburg, PA 19526
610 562-8336
Products Handled:
Lumber

Crafco, Inc.
1680 E Race St
Allentown, PA 18103
610 264-7541
Products Handled:
Asphalt—Crack Sealant

Curtis 1000
145 James Way
South Hampton, PA 18966
800 441-9292
Products Handled:
Printing Paper—Cover stock

Dart Container Corp.
60 E Main St
Leola, PA 17540
717 656-2236
www.dartcontainer.com
Products Handled:
Feedstock—Pellets PS

Delta Paper Corporation
6400 Bristol Pike
Levittown, PA 19057
215 547-6000, 800 444-6700
www.deltapaper.com
Products Handled:
Packaging

Dodge-Regupol Inc.
PO Box 989
Lancaster, PA 17608-0989
717 295-3400
www.regupol.com
Products Handled:
Blocks—Patio
Expansion Joint Fillers
Flooring
Flooring—Equine Safety
Flooring—Gun Range
Flooring—Weight Room
Liners—Truck Bed
Mats—Exercise
Mats—Golf
Mats—Hockey
Surfacing—Athletic
Surfacing—Playground
Underlay—Carpet
Underlay—Dimpled Shock Pad
Underlay—Hardwood Flooring

Drug Plastics & Glass Co., Inc
One Bottle Dr
Boyertown, PA 19512
610 367-1000
Products Handled:
Bottles

DuMor, Inc.
PO Box 142
Mifflintown, PA 17059
717 436-2106 800 598-4018
www.dumor.com
Products Handled:
Benches
Tables
Receptacles
Planters

East Penn Mfg. Co., Inc.
Deka Rd
Lyron Station, PA 19536
610 682-6361
Products Handled:
Batteries—Automotive
Batteries—Industrial
Batteries—Marine

Emert Grinding
133 Bicycle Road
Somerset, PA 15501
814 445-3703
Products Handled:
Guard Rail Blocks
Mats
Surfacing—Playground
Tiles—Floor

Erie Energy Products, Inc.
1400 Irwin Dr
Erie, PA 16505
814 454-2828, 800 233-1810
Products Handled:
Absorbents
Feedstock—Filler Fibers
Insulation—Cellulose Loose-Fill
Insulation—Cellulose Spray
Mulch—Hydroseeding
Packaging—Shredded Paper

Everlast Plastic Lumber Inc.
100 S 4th St
Hamburg, PA 19526
610 562-8336
www.everlastlumber.com
Products Handled:
Lumber

General Recreation, Inc.
PO Box 440
Newtown Square, PA 19073
800 726-4793
Products Handled:
Benches—Park
Picnic Tables
Playground Equipment

Good Heavens
PO Box 897
Narberth,PA 19072
610 668-1897, 888 745-8456
www.goodheavens.com
Products Handled:
Bags—Gym
Clothing—Head Bands
Clothing—Jackets
Clothing—Neck Warmers
Clothing—Sweater
Clothing—T-Shirts
Clothing—Vest
Cushions—Stadium
Throw Covers

Grandview Nurseries
2721 Ipnar Rd
North Huntington, PA 15642
724 863-8979
Products Handled:
Compost

Greenline Paper Company
631 S Pine St
York, PA 17403
717 845-8697, 800 641-1117
www.greenlinepaper.com
Products Handled:
Computer Paper—Form Bond
Computer Paper—Greenbar
Diskettes
Envelopes
Fax Paper
File Folders
File Folders—Hanging
Pads
Printing Paper—Bond
Printing Paper—Copy
Self-stick Removable Notes
Tissue—Facial
Tissue—Toilet

Grow Joe, Inc.
832 Jacksonville Road
Bellefonte, PA 16823
800 881-7288
www.growjoe.com

Products Handled:
Plant food

Henry Molded Products, Inc
71 N 16th St
Lebanon, PA 17042-4502
717 273-3714
www.henry-molded.com
Products Handled:
Containers—Floral
Flower Pots
Packaging—Cushion
Packaging—Custom-Molded
Packaging—Internal
Packaging—Protective
Pallet Stakker

Insul-Board Inc.
PO Box 8103
Erie, PA 16505
814 833-7400, 800 366-6814
Products Handled:
Insulation—Air Vents
Insulation—Block Core Fill
Insulation—Door Cores
Insulation—Perimeter/Foundation
Packaging—Cushion

International Envelope Company
2 Tabas Ln
Exton, PA 19341-2753
610 363-2727
Products Handled:
Envelopes

Keslick & Sons Modern Arboriculture Products
214 W Penn St
West Chester, PA 19380
610 696-5353
www.chesco.com/~treeman
Products Handled:
Tree Band Aides
Tree Ties

Leapfrog Technologies
1408 11th Ave
Altoona, PA 16601
800 443-7647
Products Handled:
Absorbents

Leo Sewell Art
3614 Pearl St
Philadelphia, PA 19106
215 387-8207
Products Handled:
Sculptures

Littlearth Productions
2211 5th Ave
Pittsburgh, PA 15219
412 471-0909
www.littleearth.com
Products Handled:
Backpacks
Furniture—CD stands

Mats From Flats
82 Fox Hollow Rd
Pequea, PA 17565
717 284-3094
Products Handled:
Mats

Max International Converters Inc.
2360 Dairy Road
Lancaster, PA 17601
717 898-0147, 800 233-0222
www.maxintl.com
Products Handled:
Adding Machine Rolls
Cash Register Rolls
Computer Paper—Carbonless
Computer Paper—Continuous Bond
Fax Paper—Thermal

Miller's Wood Recycling
65 Industrial Park Rd
Lewistown, PA 17044
717 248-WOOD
Products Handled:
Animal Bedding
Mulch

Morco Inc.
125 High St
Cochranton, PA 16314
800 247-4093
www.morcoline.com
Products Handled:
Pens
Rulers

Nelson Alternative Disposal
9081 Peach St
Waterford, PA 16441
814 864-7176
Products Handled:
Compost

New Castle Battery Company
3601 Wilmington Rd
New Castle, PA 16105
724 658-5501, 800 562-8600
www.turbostart.com
Products Handled:
Batteries—Automotive

New Pig Corporation
1 Pork Avenue
Tipton, PA 16684-0304
814 684-0608
www.newpig.com
Products Handled:
Absorbents
Mats—Absorbent
Tiles—Floor

Omega Transworld Ltd.
2400 Leechburg Road
New Kensington, PA 15068
800 541-1575
Products Handled:
Concrete

P. H. Glatfelter Company
228 South Main St
Spring Grove, PA 17362
717 225-4711
Www.glatfelter.com
Products Handled:
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Printing Paper—Book
Printing Paper—Film-Coated
Printing Paper—Offset

PPG Architectural Finishes, Inc.
151 Colfax St
Springdale, PA 15144
412 274-4500
Products Handled:
Paint

PRS Materials, Inc.
PO Box 1409
Collingdale, PA 19023
610 532-3960
Products Handled:
Absorbents—Lawn & Garden
Compost
Mulch—Hydroseeding

Penn-Pro Manufacturing
Henderson Ave & Wallace Ln
Washington, PA 15301
724 222-6450
Products Handled:
Insulation—Cellulose
Mulch—Hydroseeding

Performance Sports Apparel
1047 Macarthur Rd
Reading, PA 19605
610 373-5300
Products Handled:
Clothing

Permagrain Products Inc.
4789 W Chester Pike
Newtown Square, PA 19073
610 353-8801
www.permagrain.com
Products Handled:
Flooring

Phoenix Recycled Plastics Corporation
225 Washington St
Conshohocken, PA 19428
610 940-1590
www.plasticlumberyard.com
Products Handled:
Barriers—Safety
Benches—Locker
Benches—Mall
Benches—Park
Blocks—Truck
Containers—Trash
Curb
Decking
Docks
Fencing—Privacy
Fencing—Ranch Fencing & Gates
Flooring—Animal
Lawn Furniture
Lumber
Pallets
Parking Bollards
Parking Stops
Picnic Tables
Posts—Fence
Posts—Sign & support
Posts _ Support Pilings
Sheets—Multi-Purpose Flat
Shore Erosion Protection
Speed Bumps
Stadium Seathing
Timber—Landscape
Toilet Partitions
Traffic Barricades
Walkways—Boardwalks
Walkways—Bridges
Walkways—Portable

Polytek Pennsylvania Inc.
811 Progress Rd.
Chambersburg, PA 17201
717 267-0599
Products Handled:
Feedstock—Crumb

Port Erie Plastics
909 Troupe Ave
Harborcreek, PA 16421
814 899-7602
www.skidmarx.com
Products Handled:
Pallets

Quality Fence & Supply Ltd
2670 Division Hwy
New Holland, PA 17557
717 355-7100
Products Handled:
Lumber

Rehrig Pacific Company—PA
1738 W 20th St
Erie, PA 16502
814 455-8023, 800 458-0403
Products Handled:
Containers—Curbside Pick-Up
Containers—Drop Off
Containers—Fine Paper Collection
Containers—Home/Office Bins
Containers—Newspaper Collection
Containers—Refuse

Safety Turf, Inc
PO Box 820
Oaks, PA 19456
610 666-1779
Products Handled:
Surfacing—Playground

Santana Products/ Laminations Inc.
PO Box 2021
Scranton, PA 18501
570 343-7921, 800 368-5002
www.hinyhider.com
Products Handled:
Benches—Locker
Sheets—Plastic
Shower Dividers
Toilet Partitions
Urinal Screens
Vanities

Specialty Plastics Unlimited, Inc
765 Skippack Pike, Suite 200
Blue Bell, PA 19422
215 628-3400
www.specplast.com
Products Handled:
Benches
Containers—Trash
Decking
Fencing
Lumber
Parking Stops
Picnic Tables
Playground Equipment
Speed Bumps

Spectrum International Inc
1 Lasley Ave, Hanover Indl Estates
Wilkes-Barre, PA 18706

570 824-2500
Products Handled:
Containers

St. Jude Polymers
110 Industrial Park
Frackville, PA 17931
570 874-1220
Products Handled:
Feedstock—Pellets PET
Sheets

Total Recycling
RD 1, Box 170
Boswell, PA 15531
813 629-5675
Products Handled:
Blocks

Trafcon
81 Texaco Road
Mechanicsburg, PA 17055
717 691-8007
Products Handled:
Bases—Portable
Traffic Barricades

Tussey Mountain Recycling
RD 1, Box 53-A
Pittsfield, PA 16340
800 473-5647
Products Handled:
Animal Bedding

United Receptacle Inc.
PO Box 870
Pottsville, PA 17901-0870
717 622-7715
www.unitedrecept.com
Products Handled:
Containers—Recycling
Containers—Refuse
Urns

White Light Productions
505 Reeds Road
Downingtown, PA 19335
610 18-0645
www.whitelightproductions.com
Products Handled:
Seaglass jewelry

Wilson's Service Center
17138 Baron's Road N
Stewartstown, PA 17363
717 993-2523
Products Handled:
Mats—Floor

Windsor Barrel Works
PO Box 47
Kempton, PA 19529
610 756-4344, 800 527-7848
www.windsorbarrel.com
Products Handled:
Containers—Drop-Off

Yates Company
PO Box 8247
Erie, PA 16505
814 833-1191
Products Handled:
Custom Extrusions

Zeager Bros., Inc
4000 E Harrisburg Pike
Middletown, PA 17057
718 944-7481
Products Handled:
Mulch
Surfacing—Playground

Names _____ Group # _____
_____ Date _____
_____

SOLID WASTE MANAGEMENT METHODS

Criteria **Does this method:**	**Recycling**	**Waste to Energy**	**Landfill**	**Incinerator**
Get rid of trash?				
Cost per ton?				
Save money?				
Make money?				
Take up space?				
Cause pollution?				

Names _____ Group # _____
_____ Date _____
_____

Recycling In My Home

Directions: Many households recycle much of their garbage. Does yours? For one week keep track to what happens to the following waste products in your home: paper, steel cans, aluminum, plastic, glass, corrugated cardboard, paperboard (cereal boxes), leaves/yard waste.

Waste Product	Recycle or garbage	Mandatory or Voluntary	How often	Where does it go from here
Plastic				
Glass				
Steel Cans				
Aluminum Cans				
Paper				
Paperboard				
Corrugated				
Leaves/yard waste				

What does your family do with hard to recycle items such as: appliances, batteries, Christmas trees, bulky waste, tires, electronics, tires?

Does your family participate in any recycling events? _____

Does your family compost? _____

Names _____ Group # _____
_____ Date _____
_____

Solid Waste in My Home

Choose either a fast food meal or a home-prepared meal. Now record the data of how much waste one meal produces.

For Home-Prepared Meals:

1. Weigh and record amount of food that would be thrown away. Do not count leftovers.
2. Weigh and record amount of waste that would be thrown away. (napkins, paper towels, cans, boxes, mixes from the meal preparation, ect.)

For Fast Food Meals:

1. Weigh and record wrappers, plastic ware, lids, straws, and condiment packages.
2. Weigh and record any food that would be thrown away.

Answer the following questions.

1. What happens to this waste? _____
_____

2. Do feel that your meal produced a small/ large amount of waste? Explain. _____
_____
_____

3. What types of food produced the smallest amount of waste? Why? _____
_____

4. What types of food products produced the largest amount of waste? Why?_____
_____

5. Would you consider fast food packages a problem? Explain your answer. _____

6. Would you be willing to change your lifestyle in order to reduce solid waste from meals? How could you do this?_____

7. Was your meal waste recyclable? Hard to recycle? Reusable? _____

Composting **Name**_____

Date_____

1. List the ingredients in your compost cup:

2. Make your hypothesis: (what is going to occur to each ingredient?)

3. What surprised you most during your composting experience?

4. What were your results?

5. Do you think your school should incorporate composting as part of a recycling program? Why or Why Not? Choose a side and explain your answer.

6. Complete the flow map (Additional Tools) explaining the process of composting.

Name:_____ Date:_____

Composting Vocabulary

Directions: Define each vocabulary word below.

1. **Aerobic:**_____
2. **Anaerobic:**_____
3. **Browns:**_____
4. **Greens:**_____
5. **Nitrogen:**_____
6. **Carbon:**_____
7. **Methane:**_____

Name: _____ Date:_____

Energy

Define and describe each type of energy resource.

1. Solar energy is

2. Geothermal energy is

3. Nuclear energy is

4. Hydroelectric energy is

5. Wind energy is

6. Biomass energy is

7. Fossil fuels are

Give the definitions:

Renewable energy is
_____

Nonrenewable energy is
_____.

Circle the correct word to identify each as renewable or nonrenewable

1. solar-- renewable or nonrenewable
2. geothermal-- renewable or nonrenewable
3. nuclear-- renewable or nonrenewable
4. hydroelectric-- renewable or nonrenewable
5. wind-- renewable or nonrenewable
6. biomass-- renewable or nonrenewable
7. fossil fuels-- renewable or nonrenewable

Complete the chart and describe and illustrate the advantages and disadvantages for each resource.

Energy Source	Advantage	Disadvantage
Solar		
Geothermal		
Nuclear		
Hydroelectric		

Wind		
Biomass		
Fossil Fuels		

What is your recommendation for the best choices for energy resources in the future? Why?

Examining Product Lifecycles

The lifecycle of a sports shoe

Vinyl trim made from Venezuelan petroleum.

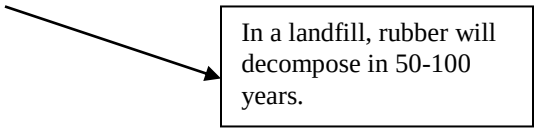
How long will it take for vinyl to decompose?

Cotton field used to be a forest.

Canvas upper from Mexico cotton.

In a landfill, cotton will decompose in 50-100 years

Rubber sole from a tree in Malaysia that's 20 years old.



Examine the diagram and answer these questions

1. What is the shoe made of? Are these components renewable or nonrenewable?
2. Where did these components come from? How long have those been around? (See the solid boxes and arrows.)
3. Where will the shoe's components go when you dispose of the shoes? How long will the components be around then?
4. Can you add other information to the diagram to tell more of the shoe's history? To begin, complete the information about the petroleum and the vinyl. Extend the diagram with additional paper, if needed.

Name_____ Date_____

Examining Product Lifecycles

Directions: Choose a product from the product list that you use each day and create a timeline of the product's lifecycle, similar to the one on the previous page.

Checklist:

- Include at least two of the product's major components. (Components are the things the product is made of.)
- Identify whether each component is renewable or nonrenewable.
- Show where each component came from and where it was 10, 50 (or more!) years ago.

- Show where each component will be in 50, 100, or 500 years in the future. (Note: even biodegradable materials tend to decompose very slowly in landfills)

Write your responses to these questions and turn them in with your timeline.

1. Was this assignment difficult? Why or why not?
2. What sources did you check to locate information on your product?
3. How difficult or easy was it to find information about your product's components, where they come from and how long they take to decompose?
4. If you found it difficult to find information, why do you think this is so?
5. Should consumers be more informed about how products are made? Why or why not? Provide reasons for your response.
6. Would it change your purchasing decision if you knew more about the production of the product? Why or why not?

Additional Tools

The learning tools in this section can be used with any of the activities contained in the PA CleanWays Environment and Ecology manual.

Name: _____

Date: _____

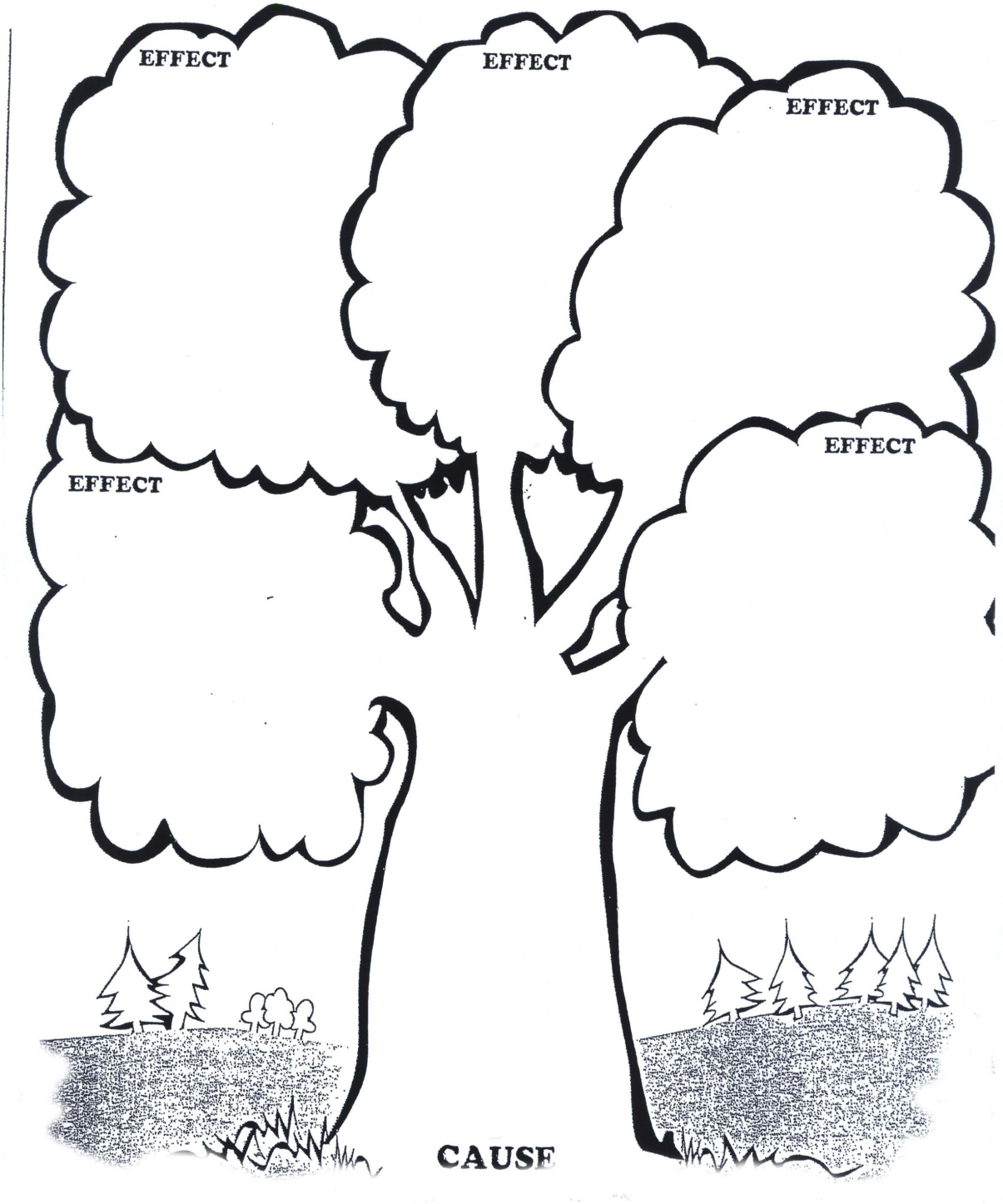
K (What I **K**now)	W (What I **W**ant to know)	L (What I Learned)

Name: _____

Date: _____

Cause and Effects Tree

Grow a cause and effects tree.
Write a cause on the trunk. Write its effects on the branches.

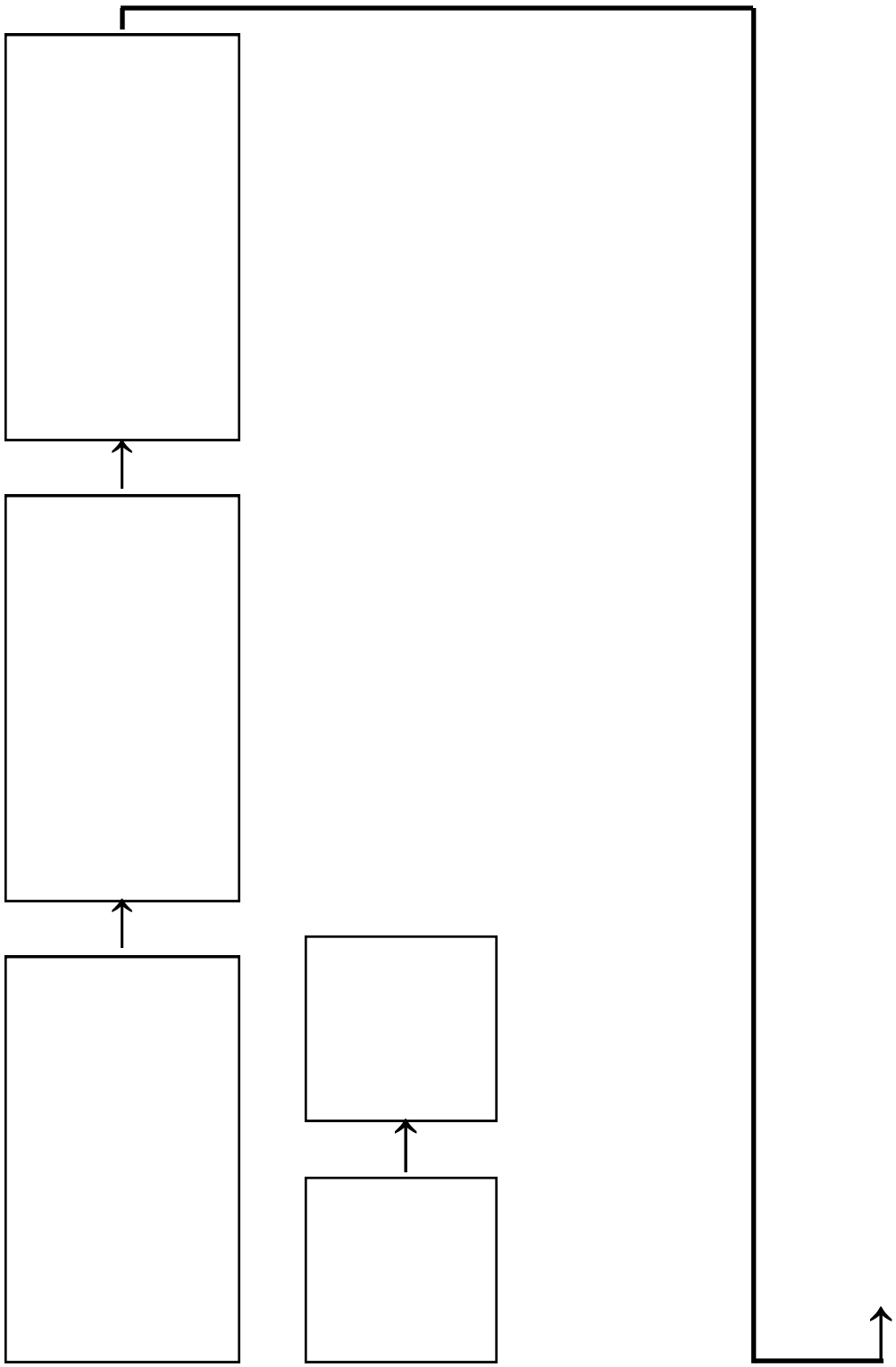


Name: _____

Date: _____

Flow Map

For sequencing stages or substages of events.



Name: _____

Date: _____

Discussion Web