CHAFFEE, LAKE & CUSTER COUNTIES, COLORADO

LESSONS IN SUSTAINABLE WASTE MANAGEMENT

Grades 3-5

Prepared for:
Buena Vista R-31 District
Salida Schools R-32-J District
Custer County School District C-1
Lake County School District R-1

May 2006
Part of a Chaffee-Lake County Solid Waste Plan
Funded by a Grant from the US Dept of Agriculture
LBA Associates, Inc., Denver, CO and
AZA Planning & Public Involvement, Heber City, UT

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CHAFFEE, LAKE & CUSTER COUNTIES, COLORADO

LESSONS IN SUSTAINABLE WASTE MANAGEMENT

May 2006

Dear Educators,

Lessons in Sustainable Waste Management, a recycling and solid waste curriculum, has been developed for four Colorado School districts:

Buena Vista R-31
Salida Schools R-32-J
Custer County School District C-1
Lake County School District R-1

It is part of a solid waste planning effort for Chaffee, Custer, and Lake Counties funded by the US Department of Agriculture, with in-kind contributions from the Colorado Association for Recycling, Chaffee County Citizens for Recycling, Upper Arkansas Recycling, and solid waste staff from the three Counties.

The goal for the lessons is:

Help students become future stewards of our environment as they assume leadership roles in their lives by providing information to make better decisions about managing solid waste as individuals and citizens through an understanding of the impact of waste in their lives and community, the finite resources of the earth, and the concept of increasing sustainable environmental relationships through reducing consumption, reusing, recycling, and composting.

The lessons target Grades 3-5. These lessons have been selected from publicly available sources and modified as necessary for consistency with format and clarity, and to address Colorado learning standards.

Included in the introductory materials are a list and maps of local recycling centers as well as a list of contact persons to verify the current status of recycling in your area. We have also provided a lengthy list of additional resources to address other grades and other issues related to waste reduction, recycling and sustainable waste management practices.

A proposal describing the approach to the curriculum, the goal statement, and proposed lessons was submitted to and reviewed by the project stakeholders, consultant LBA Associates, Inc., and a team of four educators representing each district. These educators have graciously agreed to

introduce this curriculum to the other teachers in the district. Appreciation for their efforts is extended to:

Stefani Franklin, Buena Vista R-31
Ron Dalrymple, Salida Schools R-32-J
Jennifer Gee, Custer County School District C-1
Melanie Brown, Lake County School District R-1

In preparing these materials, we recognize that you may wish to modify and adjust some of the lessons so they coordinate better with your plans for the classroom. To make this easier, all the written materials are saved electronically in MS Word format on a CD included in this binder. Please, feel free to make the lessons work for you and the students! Also, the electronic form may be convenient for keeping your notes and comments. In keeping, while we have organized the lessons by approximate grades, you may find them more appropriate for another grade level, or they may require some adjustments for the grade intended.

The following summarizes the lessons included in this curriculum.

Grade 3

1. Sarah Cynthia Sylvia Stout - Sarah Cynthia Sylvia Stout is a poem written by Shel Silverstein. It describes how she acts and feels about garbage. The moral is that no matter how much one dislikes the topic, appropriate action must be taken. As students listen to their teacher read the poem aloud they will answer questions on their worksheet.

2. Paper Trash Tracking- This is the easiest of the three trash tracking activities in this packet and is recommended for younger students. Students recycle classroom paper over a three-week period and then extrapolate findings for the entire school and the entire school year.

3. What's in a Landfill - The basic concept in this activity is that some things will decompose rapidly while others will not. The teacher will supply several large glass jars or, if one is available, an aquarium. Each student gets to add 5 small pieces of "garbage" (organic or inorganic) of their choosing to the model landfill. The items are covered with dirt and left for about 10 days, sprinkled with "rain." At the end of the period each student gets their items back and describes changes in them. Culminating the activity is a handout that shows how long samples of different items will take to decompose.

4. Making Paper From Paper - Students can make recycled paper in the classroom from torn-up waste paper. Materials needed are a blender, a flat, wide pan, a piece of window screen, some blotter papers, and a sponge. This activity can be conducted as an art project with the use of colored paper, glitter, and cookie cutters, and the paper may be used for other projects.

Grade 4

1. The Lorax - The Lorax is a short story written by Dr. Seuss. It focuses upon issues surrounding waste, reuse, and recycling. In this activity, students either read The Lorax or have it read to them by their teacher. They then complete and discuss a worksheet based upon the story. Students have the opportunity to write their own ending if the teacher feels it is appropriate.

2. A Lot of Garbage - Students will be issued a trash bag by their teacher and will keep their own personal trash for a 24-hour period. (No sharp items or bathroom waste.) The following day using a bathroom scale, students can weigh their total garbage. Using plastic gloves they will sort their waste on a tarp or newspapers spread in the room. The class can get a combined total for the day in each category and estimate class waste for a week, month, and year. Students can also remove recyclables and compostables to appropriate containers and again weigh their trash and redo the calculations to find the difference recycling and composting has on waste production

3. Composting in a Jar - Students in small groups will elect to assemble a compost pile in a jar using either kitchen scraps or yard clippings. Jars will sit 1 - 2 weeks in a fairly warm area where they can be checked regularly for about 10 minutes every other day. Students will use hand lenses to look for decomposers and make a graph over time of the height of their pile and its internal temperature.

4. Landfill in A Jug - Students in groups create their own landfill by cutting a 1 – gallon plastic bottle in half, filling the bottle with soil, and creating a lined cavity for garbage. Each group adds small pieces of garbage to their landfill, packs soil over it, adds some water to simulate rain, and seals the system with plastic wrap. After about 2 weeks students dismantle the system and describe changes in the appearance of their garbage items. They also check for "leachate".

Grade 5

1. The Birds of Zazurds - This illustrated rhyming story is written in the spirit of Dr. Seuss, but the reading is more extensive than The Lorax and the activities associated with it require higher thinking. It provides an excellent overview of waste issues in general.

2. Track Your Waste - The school contacts parents, and each student participates in a home audit of waste and recyclables for a one-week period by taking out the trash and recycling and weighing themselves before and after they empty the material. Students record data from their household and bring the figures to school. Calculations are done to extrapolate data over time from their total refuse disposed and materials recycled and composted.

3. Types of Plastic - Students begin the activity at home by finding and listing 2-5 plastic items at home. They are asked to focus on plastics with coded recycling numbers and include the numbers on their inventory list. The following day in class, students working in groups will be given samples of plastics numbered 1-7. In an organized science experiment, they will apply several tests to recognize the plastic's properties.

   Plastics "Unknown" – As an add-on, this challenging activity is designed to follow the Types of Plastic activity for advanced students or as extra-credit. The teacher will give the student a 1" unidentified square sample of one of 6 types of plastic. By performing the set of tests and using the same simple water-based solutions as in the Recycling Plastics activity, students will identify it by name.

4. The Life Cycle of Glass - Students read how glass is produced and recycled. They are presented with data regarding energy use and resource consumption for both processes. Students then make calculations of savings that accrue due to recycling.

Optional Activities

Depending upon teacher goals, the interest level of students and time available, we offer some additional exercises that expand the depth of knowledge of the subject. They are described below.

1. Packaging - (Best for grades 4 or 5) In this lesson on waste reduction, the teacher brings to class some samples of foods that are sold in at least 3 varied sizes. Students work in groups to do two basic calculations: 1) The cost per unit of weight of actual food disregarding the weight of the packaging and 2) weight of the packaging per unit of weight of food purchased. The learning should be that larger sizes are best in terms of cost of food as well as amount of waste generated.

2. The Life Cycle of Aluminum - (Best for grades 4 or 5) This activity follows the format of The Life Cycle of Glass. It describes the process of making aluminum cans and the resource savings derived from recycling using math calculations.

3. Paper Recycling - (Best for Grades 4 or 5) This activity is directed to illustrate to students savings that accrue from paper recycling. It is similar to Paper Trash Tracking done in Grade 3, but the math expectations are higher.

4. Steps to Recycle – (Best for Grades 3 and 4) A field trip to the recycling center and scavenger hunt style tour of the school makes this an active lesson to help students realize the steps necessary to set up a school recycling program. For schools interested in setting up a school recycling program, an electronic link can take them to the EPA's booklet, "Reuse + Recycling = Waste Reduction, A Guide for Schools & Groups."

5. "Ollie Saves the Planet" (For ages 5 up to Adult) An interactive CD ROM, "Ollie" offers an animated video, arcade games, and activities with a special section for educators. In addition to solid waste issues, the materials address sustainability through protecting water, air, energy, and biodiversity. Its intention is use for independent study or computer instruction, and it carries the endorsement of many groups, including the National Recycling Coalition.

We printed the curriculum on 35% post-consumer recycled paper. While some sheets are single-sided to make copying easier for you, we encourage you to make double-sided copies to save paper, or to innovatively rethink some of these exercises so they use no paper at all.

Ann Zimmerman and Bill Getz from AZA Planning and Public Involvement prepared the materials as part of a planning team headed by LBA Associates, Inc., Denver, Colorado.

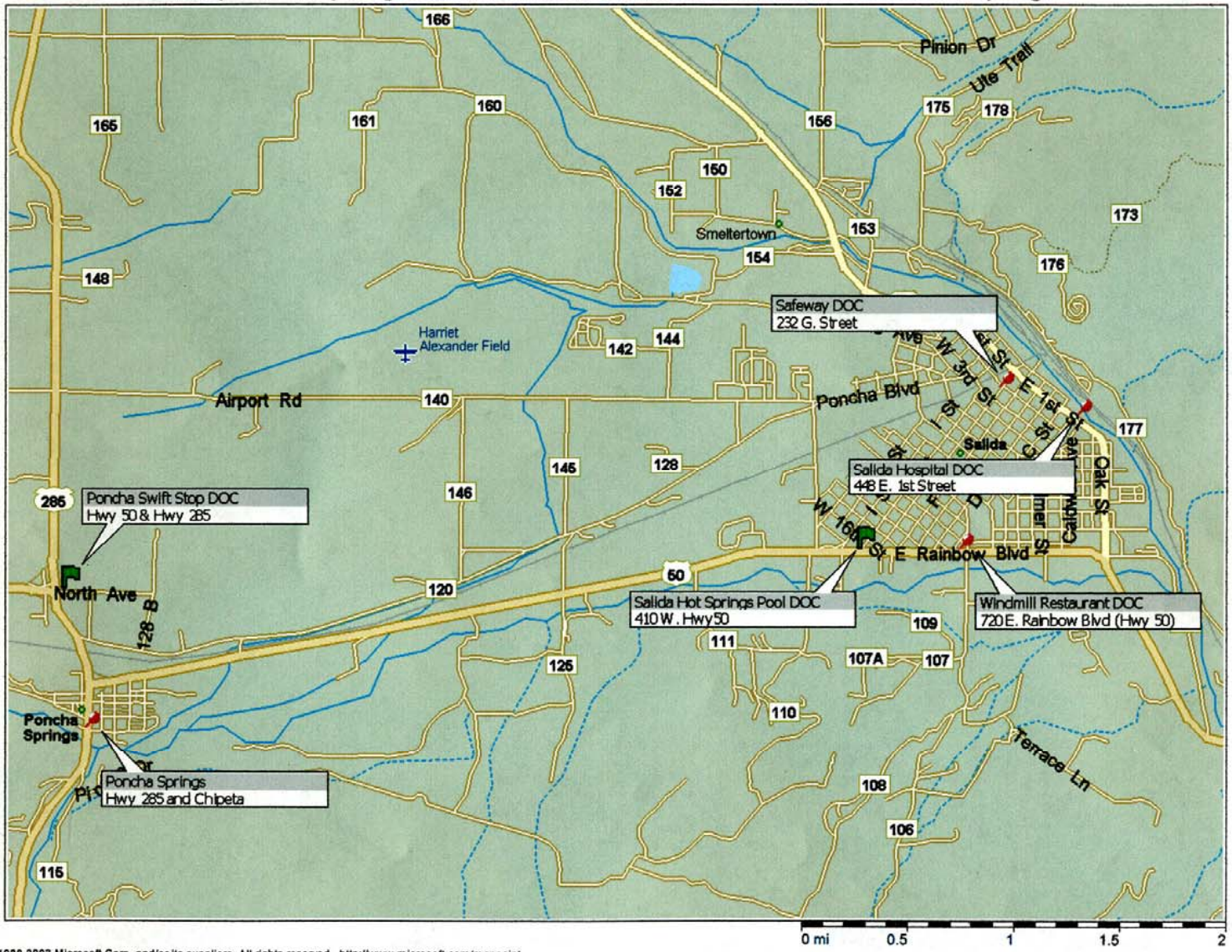
We hope you find these exercises useful, stimulating and educational for the students.

Regards,

Ann Zimmerman and Bill Getz

AZA Planning & Public Involvement
261 N. 400 West/ P.O Box 289/ Heber City, UT 84032/800.654.7897/fax 435.654.5090/zimfolks@sprynet.com

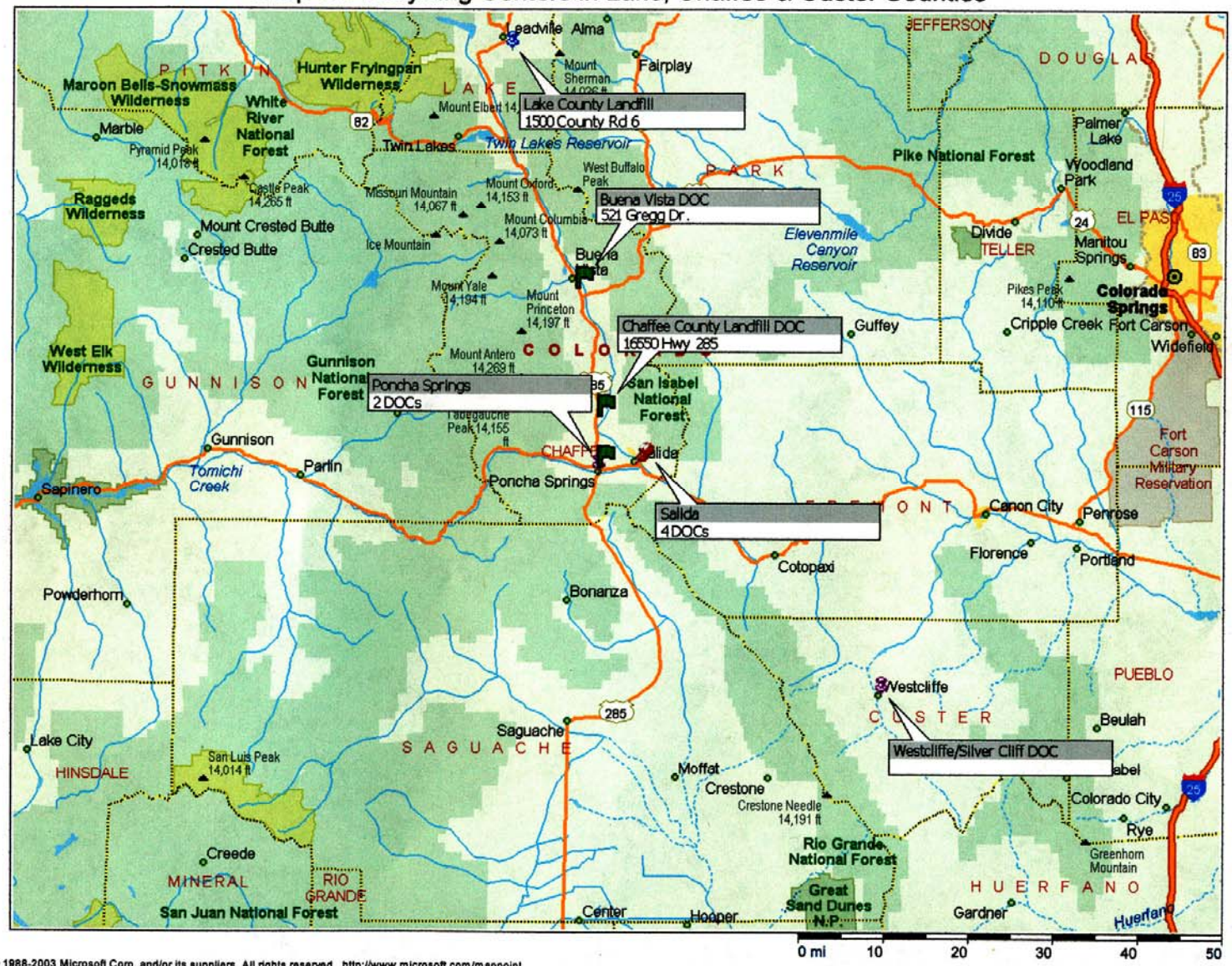
Drop-Off Recycling Center Detailed Locations in Salida and Poncha Springs



LOCATION	SITE	HOURS	MATERIALS
CHAFFEE COUNTY	Contact = Shannon Wilcox Landfill Manager	719-539-3738	
Salida	Windmill Restaurant 720 E. Rainbow Blvd (Hwy 50) (in back of restaurant)	Open 24/7	OCC
Salida	Salida Hospital 448 E. 1st Street (in back of hospital)	Open 24/7	OCC
Salida	Safeway 232 G Street (NW side)	Open 24/7	OCC
Salida	Salida Hot Springs Pool 410 W. Hwy 50 (in back)	Open 24/7	ONP, MP, OCC cans, glass, plastic
Between Salida & Buena Vista	Chaffee County Landfill 16550 Hwy 285	Open 8am-4pm Mon-Sat	ONP, MP, OCC cans, glass, plastic motor oil, car batteries
Buena Vista	Buena Vista Recycling Center 521 Gregg Drive	Open 24/7	ONP, MP, OCC cans, glass, plastic
Poncha Springs	Poncha Swift Shop Hwy 50	Open 24/7	OCC
Poncha Springs	Chipeta Ave. & Hwy 285 (south of High Valley Center)	Open 24/7	ONP cans, glass
LAKE COUNTY	Contact = John Chichester Landfill Manager	719-2071744 jaichicolorado@hotmail.com	
Leadville	Lake County Landfill 1500 County Road 6 (1.7 miles south of Leadville)	Open 8am-5pm Mon-Sat	ONP, OCC, OTD 0ffice paper, OMG, paperboard cans, glass, plastic
CUSTER COUNTY	Contact = Beth Lenz Upper Arkansas Recycling	719-275-8350 bethlenz@uaacog.com	
Westcliffe	Near town hall, off 6th St.	Open 24/7	ONP cans, glass, plastic

OCC = corrugated cardboard
ONP = newspaper
OMG = magazines
MP = mixed paper (office paper + magazines)
OTD = telephone directories
Cans = aluminum, steel and tin
Glass = brown and clear glass only
Plastic = any plastic container with recycling emblem and number 1-7 in the center; plastic shopping bags (not trash bags)
24/7 = Open every day, all day

Drop-Off Recycling Centers in Lake, Chaffee & Custer Counties



Resources & Bibliography

This bibliography is an edited version of a list compiled largely by the Oregon Department of Environmental Quality in their work: Rethinking Recycling: An Oregon Waste Reduction Curriculum. Many sites were deleted and others of a more recent nature have been added.

Software

Choices, Choices: Kids And The Environment, Mac/Win, Tom Snyder Productions, 80 Coolidge Hill Road, Watertown, MA 02172, 800-342-0236.

Decisions, Decisions: The Environment, Mac/Win, Tom Snyder Productions, 80 Coolidge Hill Road, Watertown, MA 02172, 800-342-0236.

EarthAware, Mac/Win, EnviroAccount Software, 605 Sunset Court, Davis, CA 95616.

Earth Explorer, Mac/Win, Sunburst Communications, Inc., 101 Castleton Street, P.O. Box 100, Pleasantville, NY 10570, 800-321-7511.

EcoExpert Environmental Science Series (Case Of The Polluted Playground), IBM, Texas Learning Technology Group, P.O. Box 2947, Austin, TX 78768, 800-580-8584.

EcoExpert Environmental Science Series (Fuel Site Quandary), IBM, Texas Learning Technology Group, P.O. Box 2947, Austin, TX 78768, 800-580-8584.

Garbage Tale: An Environmental Adventure, Laserdisc, SVE/Churchill Media, 6677 N. Northwest Highway, Chicago, IL 60631-1304, 800-829-1900.

Introduction To General Environmental Studies: Waste, Mac/IBM, Compress. Available From Education Software Institute, 4213 South 94th Street, Omaha, NE 68127, 800-955-5570.

Kids' Network: Too Much Trash?, Mac/Win, National Geographic Society, Educational Media Division, P.O. Box 98018, Washington, DC 20090, 800-368-2728.

Ollie Saves the Planet, Mac/Win, Sustain Ability, Intl., LLC, PO Box 75, Camberwell, Vic Australia 3124, http://wwww.olliesworld.com

Our Environment, Mac/Win, Sunburst Communications, Inc., 101 Castleton Street, P.O. Box 100, Pleasantville, NY 10570, 800-321-7511.

Roscoe's Totally Cycled World, Mac/Win, Steel Recycling Institute, 680 Andersen Drive, Pittsburgh, PA 15220, 800-876-7274.

Science And The Environment, Mac/Win, Dos, Unix, Environmental Media Corporation, P.O. Box 99, Beaufort, SC 29901, 800-368-3382.

SimEarth Classic, Mac/Win, Maxis, 2121 North California Blvd., Suite #600, Walnut Creek, CA 94596, 510-933-5630.

Think Earth/Captain Energy And His EcoAdventures!, Mac/Win, MultiMedia Associates. Available From Education Software Institute, 4213 South 94th Street, Omaha, NE 68127, 800-955-5570.

Trash Goes To School, IBM, Cornell Cooperative Extension, Resource Center, 7 Business & Technology Park, Cornell University, Ithaca, NY 14850, 607-2552080.

Internet Addresses

COMPOSTING:

California Integrated Waste Management Board, www.ciwmb.ca.gov/organics/
Composting For Home Gardens, www.ces.ncsu.edu/hil/hil-8100.html
Concordia Student Union, www.cug.concordia.ca/~csu/handbook/enviro/composting.html
Cornell University/Cornell Composting, www.cals.cornell.edu/dept/compost
Cornell Composting/Composting In Schools, The Cornell Waste Management Institute, Cornell Center For The Environment, www.cfe.cornell.edu/compost/schools.html
Home Composting The Easy Way, www.zapcom.net/~compost/
The Master Composter, www.mastercomposter.com
Michigan State University Extension/Backyard Composting, www.gvrd.bc.ca/waste/bro/swbckyr.html.
North Carolina Cooperative Extension Service (Composting For Home Gardens), www.ces.ncsu.edu/hil/hil-8100.html
Planet Natural, www.palnetnatural.com/composting.html
Oregon Department of Environmental Quality, www.deq.state.or.us/wmc/solwaste/compostbrochure.html
Rot Web, www.net.indra.com/~topsoil/Compost/menu.html
The Compost Recipe, www.gov.nb.ca/environm/comucate/compost/nurep.htm
Veggies Unite! What Not To Compost, www.vegweb.com/composting/what-not.shtml

ENVIRONMENTAL EDUCATION:

California Department Of Education, Office Of Environmental Education, www.cde.ca.gov/cilbranch/oee/
California Environmental Education Resource Guide, www.cde.ca.gov/cilbranch/oee/ceerg/cover.html
Center for Environmental Education, www.uni.edu/ceee/simplify/
E Patrol, E Patrol Foundation, www.sprint.com/epatrol/
Educational Resources Information/Clearinghouse For Science, Mathematics, And Environmental Education (CSMEE), www.ericse.org
EE Link, www.eelink.net/html/easysearch.html
ENC Resource Finder, Eisenhower National Clearinghouse, www.enc.org.
EPA National Service Center for Environmental Publications, http://nepis.epa.gov/
Environmental Education And Training Partnership (EETAP), www.eetap.org
Environmental Literacy Council, www.enviroliteracy.org
Generation Earth, www.generationearth.com
Green Teacher, http://www.greenteacher.com/
National Consortium For Environmental Education And Training, www.nceet.snre.umich.edu/nceet.html
National Consortium For Environmental Education And Training, www.nceet.snre.umich.edu/nceet.html
North American Association Of Environmental Education, www.naaee.org
Searching SEEK (Sharing Environmental Education Knowledge), www.seek.state.mn.us/search/search.cfm/
The Environmental Education Network, www.envirolink.org/enviroed/
The Global Thinking Project, Georgia State University, www.teaparty.terc.edu/comweb/globalthinking/home/glothinking.htm
U.S. Environmental Protection Agency, Teachers and Kids, http://www.epa.gov/epahome/students.htm ; http://www.epa.gov/osw/students/school.pdf

HAZARDOUS WASTE:

Environmental Defense Fund, www.edf.org
Environmental Protection Agency,www.epa.gov/grtlakes/seahome/housewaste/src/open.htm
Metro Regional website, www.metro-region.org/rem/hazw/hazwas.html
Oregon Department of Environmental Quality, www.deq.state.or.us/wmc/solwaste/hhw.html
Recycled Battery & Reuse Coalition, www.rbrc.org

RECYCLING:

40 Tips To Go Green, www.ceres.ca.gov/calweb/40tips.html
America Recycles Day, www.americarecyclesday.org/ard/index.asp
California Integrated Waste Management Board, www.ciwmb.ca.gov/recycle/

*Can Manufacturers Institute, www.cancentral.com, two downloadable educator packets, one for Grades 4-6, and the other for grades 6-9.
City of Portland, Bureau of Environmental Services,www.enviro.ci.portland.or.us/
Environmental Systems Of America (Recycling Factoids), www.envirosystemsinc.com/factoids.html
Environmental Web Directory, www.webdirectory.com/Recycling/
Global Recycling Network, www.grn.com/
Mississippi State University: Paper Recycling, www.ext.msstate.edu/pubs/pub1670.htm
Natural Resource Defense Council (Garbage And Recycling), www.mail.igc.apc.org/nrdc/bkgrd/gatten.html
Pennsylvania Used Oil Recycling Information Center, www.dep.state.pa.us
POPSI Environmental Education Program, www.popsi.com

Recycle City, Environmental Protection Agency Region 9, www.epa.gov/region09/recyclecity/
Recycling Slide Show, Recycle America, www.crest.org/environment/growth/general/recycle-slides/index.html
Recycler's World, www.recycle.net/
**Steel Recycling Institute, www.recycle-steel.org, Earth Recycles and Roscoe's Totally Recycled World
Think Earth, www.edspecialists.com
TreePeople: Generation Earth Program, www.generationearth.com
United States Environmental Protection Agency, www.epa.gov/epaoswer/non-hw/recycle/index.htm
Wisconsin Department Of Natural Resources/EE For Kids, www.dnr.state.wi.us/eek
Youth Recycling, www.unesco.org/youth/recycle.htm

* Recommended by Executive Director of CAFR
** Recommended by member of Chaffee County Citizens for Recycling.

REUSE:

Clothing Donation, www.charityguide.org/fewhours/clothesdrive.htm
School and Community Reuse Action Project (SCRAP), www.scrapaction.org
Resource Revival, www.resourcerevival.com
Reuse Development Organization, www.redo.org/

SOLID WASTE AND RESOURCE MANAGEMENT:

Aluminum Association, www.aluminum.org/
American Forest & Paper Association, www.afandpa.org/
American Petroleum Institute, www.api.org/tchrmaterial.htm
American Plastics Council, www.plastics.org

Aseptic Packaging Council, www.aseptic.org
BFI Company/Landfills, www.bfi.com/landfill/index.html
California Integrated Waste Management Board, www.ciwmb.ca.gov
CERES (California Environmental Resources Evaluation System), ceres.ca.gov/education/
Environmental Industry: Professionally Managed Landfills: A Vital Environmental Resource, www.envasns.org/eii/garbage/landfills.htm
Oregon Department of Environmental Quality, www.deq.state.or.us/wmc/solwaste/rsw.htm
Plastic Bag Information Clearinghouse, www.plasticbag.com
Society of Plastics Industry, www.socplas.org/
Steel Recycling Institute, www.recycle-steel.org
U.S. Department of Interior The Natural Resources Library, www.ios.doi.gov/nrl/
U.S. EPA Office Of Solid Waste: Safer Disposal For Solid Waste, The Federal Regulations For Landfills, www.epa.gov/epaoswer/non-hw/muncpl/safedis.htm

SOURCE REDUCTION:

County of Stanislaus, the Citizen's 3 R's of Garbage, www.co.stanislaus.ca.us/er/3rsgarb.htm
Commercial Waste Reduction Clearinghouse (sponsored by Oregon DEQ), www.deq.state.or.us/wmc/cwrc.html
Conservation Education Program, www.fs.fed.us/outdoors/nrce/welcome.htm
Do It Yourself: Stop Junk Mail And Phone Calls, www.obviously.com/junkmail/
EPA Resource Guide Of Solid Waste Educational Materials, U.S. Environmental Protection Agency, www.epa.gov/epaoswer/general/bibligr/educatn.htm
Flexible Packaging Educational Foundation, www.flexpack.org
Guideline For Environmentally Responsible Packaging, www.corp.hp.com/publish/talkpkg/enviro/environm.htm
HP Externally Packaging Web Site Guideline For Environmentally Responsible Packaging, www.corp.hp.com/publish/talkpkg/enviro/environm.htm
It's Your Choice, www.cygnus-group.com/packaging/Flex/pkging.html
Michigan State University Extension, Waste Reduction-For Home And Office, www.msue.mus.edu/msue/imp/mod02/01500569.html
National Waste Prevention Coalition, http://dnr.metrokc.gov/swd/nwpc/index.htm
Newton's Apple: Garbage KTCA Twin Cities Public Television/NSTA, www.ktca.org/newtons/11/garbage.html
State Of Iowa Energy Education, www.state.ia.us/government/dnr/organiza/egd/chap7.htm
U.S. EPA Office Of Solid Waste, www.epa.gov/osw/students.htm

SUSTAINABILITY:

Center of Excellence for Sustainable Development, www.sustainable.doe.gov/overview/ovintro.htm
Oregon Solutions.net, www.oregonsolutions.net/tools/tools/index.cfm
Sustainability.com, www.sustainability.com

Union of Concerned Scientists, www.ucsusa.org

VERMICOMPOSTING:

Alaska's Can-O-Worms, www.can-o-worms-alaska.net/
Biological Homegrown Farms, www.freeyellow.com/members/biohomegf/index.html
California Integrated Waste Management Board,
www.ciwmb.ca.gov/schools/classroom/worms.htm
Canada's Office Of Urban Agriculture/City Farmer, www.cityfarmer.org
Classroom Vericomposting, www.interware.net/~levine/worms/
New Jersey Online, www.nj.com/yucky/worm/
Progressive Organic Solutions, www.vermicentral.com/
Sale Of Worms And Worm Castings, www.worm-publications.com/growers/oasiswfs.html
University Of Nebraska Cooperative Extension,
www.ianr.unl.edu/ianr/lance/enviro/pest/factwheets/vermich.html
Vermico's Casting Call, www.vermico.com/news.html
Vermiculture, North Carolina State University, Wiggling N'Vermicomposting,
www.home.att.net/~tnoloand/
Worm Digest, www.wormdigest.org/
Worm Woman's Web Site, www.wormwoman.com/frameindex.html
Worm World, www.globalclassroom.org/worms.html

Other Environmental Curricula

***Arizona Department of Environmental Quality**, http://www.AZRecycles.gov/, Mission 3R, Grades 4-6.

Association of Vermont Recyclers, P O Box 1244, Montpelier, VT,05601, (802) 454-8400 has produced AVR Teachers Resource Guide for Solid Waste and Recycling Education which has activities for grades K-12.

California Integrated Waste Management Board,
http://www.ciwmb.ca.gov/Schools/Curriculum/default.htm, hosts a variety of environmental education materials available to teachers, including Closing the Loop for K-6, (916) 341-6765.

The Chewonki Foundation for the Maine Waste Management Agency, Wiscasset, Maine, 04578, Has published Pathways to a Sustainable Future, A curriculum Guide for schools exploring waste management issues http://www.chewonki.org,/. ww.chewonki.org

Environmental Education on the Internet, http://eelink.net, sponsored by the Nort666h American Environmental Education Association.

Environmental Protection Agency (EPA), http://www.epa.gov/teachers/curriculum-

resources.htm,hosts a list of various environmental curriculums by subject. 1200 Pennsylvania Avenue, NW Washington, DC 20460, (202) 260-2090 or Region 10 Office (Seattle) (800) 424-4372. http://www.epa.gov/enviroed/oeecat/, is the page for environmental education materials provided by the EPA. A list of activities related to hazardous waste is at: epa.gov/superfund/students/clas-act. A recently published set of K-8 activities is at epa.gov/epaoswer/education/quest http://www.epa.gov/superfund/students/clas-act.

Food, Land and People, http://www.foodlandpeople.org, National Office, Presidio National Park, P.O. Box 29474, San Francisco, CA 94129, (415) 561-4445.

Globe, http://www.globe.gov, Oregon Coordinator, Vicki Osis, Hatfield Marine Science Center, Extension Sea Grant Program, Oregon State University, Newport, (541) 867-0257.
Keep America Beautiful, http://www.kab.org, Waste In Place for K-6, 1010 Washington Boulevard, Stamford, CT 06901, (203) 323-8987.

Minnesota Office of Environmental Assistance, http://www.moea.state.mn.us/ee/index.cfm, hosts a variety of environmental education materials for teachers, including *Whata Waste* for K-12, 520 Lafayette Rd N Floor 2, St. Paul, MN 55155, 651-296-3417.

Minnesota Pollution Control Agency and The Minnesota Department of Education, 644 Capitol Square Bldg, St. Paul, MN 55101, have produced: Teachers Guide: Educational Materials in Resource Recovery. Activities are appropriate for grades K-12

New Jersey Teachers and Solid Waste Professionals, Depaartment of Environmental Protection, Division of Solid Waste Management, CN 414, Trenton, New Jersey 08625. Here Today Here Tomorrow is a series of classroom activities directed at grades 4-8.

North Carolina Environmental Education Clearinghouse, http://www.ee.enr.state.nc.us, NCDENR, Office of Environmental Education, 1609 Mail Service Center, Raleigh, NC 27699, (919) 733-0711.

Pennsylvania Department of Environmental Protection, Fulton Bldg,PO Box 2063 Harrisburg, PA has developed a series of recycling lesson plans. They can be reached at (717) 787-7382 or at www.DEP.state.pa.us.

Project Learning Tree, http://www.plt.org/, includes the solid waste module for 6-12.

Project Wild, http://www.projectwild.org/, National Office, 5555 Morningside Drive, Suite 212, Houston, TX 77005 (713) 520-1936.

***South Carolina Department of Health and Environmental Control**, http://www.scdhec.net/eqc/, includes various environmental education materials for teachers including Action for a Cleaner Tomorrow for K-8, 2600 Bull Street, Columbia, SC 29201, (803)

896-8940.

Wisconsin Department of Natural Resources, P O Box 7921, Madison, WI 53707, (608)266-2621 Has produced Recycling Study Guide: The 4th R.

* Recommended by Executive Director of CAFR

Selected Associations

ENVIRONMENTAL

America the Beautiful Fund (ABF), 210 Shoreham Bldg. NW, Washington DC 20005, (202) 638-1649, Paul Bruce Dowling, Exec. Dir. Offers recognition, technical support and small seed grants to individuals and community groups to initiate new local action projects to improve the quality of the environment. Presents National Recognition Awards for superior projects in the US.

Better World Society, 1100 17th St. NW, Washington DC 20036. Promotes public awareness of worldwide environmental issues.

Carrying Capacity Network, 1325 G St. NW, Suite 1002, Washington DC 20005-3104, (202) 879-3044, Stephen Mabley, Network Coordinator. Facilitates cooperation/sharing among activist groups, forum for development/exchange of information on carrying capacity of the earth (number of individuals resources can support with degradation of physical, ecological, cultural, and social environments).

CEIP Fund, 68 Harrison Ave., 5th Fl., Boston, MA 02111, (617) 426-4375. Provides paid full-time internships for upper-level and graduate students with private industry, government agencies and non-profit organizations in conservation services, public policy and community development, and technical services. Publishes book on careers in environmental areas.

Citizens for a Better Environment, 407 S. Dearborn, Suite 1775, Chicago, IL 60605, (312) 939-1530. Citizens concerned with environmental protection. Research, public information and education, advocacy, technical assistance to community-based organizations.

Concern, 1794 Columbia Rd. NW, Washington DC 20009, (202) 3288160. Provides environmental information to individuals and groups and encourages community-level environmental action.

The Cousteau Society, 930 W. 21st St., Norfolk, VA 23517, (804) 6271144. Environmental education organization dedicated to protection and improvement of quality of life for present and future generations. Conducts education, research and evaluation of man-nature interactions.

Elmwood Institute, P.O. Box 5765, Berkeley, CA 94705-0765, (415) 8454595.
Forum for research, formulation, discussion, practical

application of “Ecothinking”, awareness of global interdependence, ecological wisdom, etc. Intellectual resource for the Green movement, conducts workshops, seminars, etc.

Environmental Defense Fund, 257 Park Ave. S., New York, NY 10010, (212) 505-2100. Public interest organization promotes research, public education and administrative and legislative action toward the protection and improvement of environmental quality. Friends of the Earth, 218 D St. SE, Washington DC 20003, (202) 5442600. Lobbies congress, issues publications to further environmental goals.

Global Tomorrow Coalition, 1325 G St. NW, Washington DC 20005, (202) 628-4016. Studies global trends in population growth, use of natural resources, and the environment.

Green Seal, P.O. Box 1694, Palo Alto, CA 94302 (415) 327-2200. Developing an unbiased criteria to evaluate environmental impacts of consumer products. Evaluation will use life cycle analysis (raw material to manufacturing through consumer usage to recycling or disposal), and will publish list of products awarded “the Green Seal”.

Institute for Earth Education, P.O. Box 288, Warrenville, IL 60555, (708) 393-3096. International institute of environmental educators, provides programs, consulting services, etc.

Institute for Environmental Education, 32000 Chagrin Blvd., Cleveland, OH 44124, (216) 464-1775. Seeks to improve environmental education in schools by providing information, sponsoring summer internships for teachers.

Izaak Walton League of America, 1401 Wilson Blvd., Level B. Arlington, VA 22209, (703) 528-1818. Educates the public to conserve maintain, protect and restore environment and natural resources.

Kids for a Clean Environment, P.O. Box 158254, Nashville, TN 37215, (615) 331-0708. Children’s environmental organization provides information, projects for kids to make positive impact on the environment.

League of Women Voters Education Fund, 1730 M St. NW, Washington DC 20036.

National Appropriate Technology Assistance Service, U. S. Department of Energy, P.O. Box 2525, Butte, MT 59702-2525, 1-800-428-2525. Established in 1984, NATAS helps individuals, small businesses, federal, state and local governments, non-profits and other groups implement projects that use renewable energy or energy efficiency. Provides technical engineering and commercialization assistance, referral to appropriate sources, and provides information and materials on teaching about energy in schools.

National Geographic Society, 17th and M Sts. NW, Washington DC 20036, (202) 857-7000. Scientific educational nonprofit organization supports environmental research.

Natural Resources Defense Council, 40 W. 20th St., New York, NY10011, (212) 727-4412. Lawyers, scientists, public health specialists and planners dedicated to the wise management of natural resources through research, public education and development of public policies. Monitors regulatory agencies to ensure that public interest is considered. Produces "A kid's guide to protecting the planet" coloring and activity guide.

Rainforest Alliance, 270 Lafayette St., Suite 512, New York, NY 10012, (212) 941-1900. Encourages attitudes and actions to protect worldwide rainforests through education, public awareness, speakers' bureau, projects to involve individuals.

Ranger Rick's Nature Club, 8925 Leesburg Pike, Vienna, VA 22184, (703) 790-4000. Children's division of National Wildlife Federation, teaches young children to know and respect living things, conservation, and wise use of natural resources.

Renew America, 1400 Sixteenth Street NW Suite 710, Washington DC 20036, (202) 232-2252. Nonprofit educational organization providing national clearinghouse for successful environmental programs. Publications include Environmental Success Index (directory of over 1200 verified model programs), and a State of the States report, which ranks states according to environmental achievements.

Rocky Mountain Institute, 1739 Snowmass Creek Rd., Old Snowmass, CO 81654, (303) 927-3128. Promotes efficient and sustainable use of resources, including use of recycled building materials.

Sierra Club, 730 Polk St., San Francisco, CA 94109, (415) 776-2211. Individuals concerned with relationships between people and nature, promotes protection and conservation of natural resources through education, political action campaigns, influence public policy at all levels, schedules outings, presents awards, maintains library on environmental topics.

The Wilderness Society, 900 17th St. NW, Washington DC 20006-2596, (202) 833-2300. Works to establish the land ethic as basic element of American culture and philosophy, education on broader wilderness preservation and land protection constituency. Focuses on federal, legislative and administrative actions affecting public lands. Programs include grass roots organizing, lobbying, research and public education, presents annual awards, compiles statistics.

World Wildlife Fund, 1250 24th St. NW, Washington DC 20037, (202) 293-4800. Seeks to protect the biological resources upon which human well being depends, emphasizes preservation of endangered wildlife, plants and habitat. Maintains library, supports projects and services of various organizations, individuals, groups, administers J. Paul Getty Wildlife Conservation Prize.

EDUCATIONAL

Environmental Education Association of Oregon, P.O. Box 40047, Portland, OR 97240, 1-800-322-3326 or 503-725-8294. Local affiliate of the North American Environmental Education Association, sponsors teacher training, annual conference, and grants. Membership includes a subscription to Clearing magazine.

National Science Teachers Association, Publications, 1742 Connecticut Avenue NW, Washington DC 20009, 1-800-722-NSTA. Largest science teachers association in the U.S. working to improve quality of science education, publishes educational products and activity books grades K-College. Free catalog, materials for a fee. www.nsta.org

North American Association for Environmental Education, P.O. Box 400, Troy, OH 45373, 513-339-6835, Educators and interested individuals and organizations promote and coordinate environmental education programs at all levels, disseminate information, provide technical assistance, promote communication and networking regarding environmental education, presents annual awards for environmental education. www.naee.org

TOXIC AND HAZARDOUS HOUSEHOLD WASTE

Bio-Integral Resource Center, P.O. Box 7414, Berkeley, CA 94707, (415) 524-2567. Information clearinghouse on newest methods of less toxic pest control.

Center for Safety in the Arts (CSA), 5 Beekman St., Suite 1030, New York, NY 10038. Information clearinghouse for research and education on hazards in the visual/performing arts and school art programs.

Citizens Clearinghouse for Hazardous Waste, P.O. Box 926, Arlington, VA 22216, (703) 276-7070. Grassroots organization promoting public awareness and legislative involvement in hazardous waste issues.

Household Hazardous Waste Project, 1031 E. Battlefield, Suite 21, Springfield, MO 65807, (417) 899-5000. Develops and promotes HHW education; provides training, consultation, educational materials and a referral information service.

Waste Watch Center, Dana Duxbury and Associates, 16 Haverhill St., Andover, MA 01810 (508) 470-3044. Considered one of the leading sources for HHW management information in the country, sponsors national HHW conference, detailed bibliography of publications.

Washington Toxics Coalition, 4516 University Way NE, Seattle, WA 98105, (206) 632-1545. Provides information on effective alternatives to hazardous products.

Making Paper From Paper

(Adapted from: Rethinking Recycling, An Oregon Waste Reduction Curriculum, Oregon Department of Environmental Quality

Teacher Worksheet

Background

Students may not realize it, but they use large amounts of recycled paper every day. Cereal boxes, paper toweling, toilet paper, cake mix boxes, shoeboxes and many other things used daily all contain recycled fibers.

In this activity students will make their own recycled paper. The activity can be made into an art project if you wish. At the time just before their mix is poured on the screen, students can add food coloring, leaves, dried flower petals, glitter, or other materials. Colored construction paper cut into very small pieces gives an interesting effect. If at any step the paper is unsatisfactory, just return it to the blender and start again. Some classes have used cookie cutters on the paper after it has dried. It takes a day or two to dry, so by making paper on a Friday, it will be ready for using in an art project on Monday.

Materials

- Paper torn into small squares about 1" or smaller - done by the students
- Water
- A measuring cup and a regular cup (for scooping)
- A blender
- A wide flat rectangular pan like a cake pan
- A piece of window screen about 6" square - it helps to have it on a frame of popsicle sticks
- A tablespoon of clothes dryer lint
- Decorative items for the paper that students can bring on their own (see above) like leaves or flower petals, bits of colored thread, plus food coloring, glitter, or other materials for “special” effects
- For each student a piece or two of heavier construction paper to act as a blotter, and paper towels
- A sponge
- (Optional) Tablespoon of dishwashing detergent if white paper is desired
- (Optional) Clothes iron to speed paper drying
- (Optional) Cookie cutters

Procedure

Basically, follow the instructions on the following two pages. Depending upon the number of participants in the activity, you may need a couple of sets of materials

Colorado Educational Standards Supported

Geography	5.3	Student will discuss the role of resources in everyday life
Art	1	Student recognizes and uses visual arts as a form of communication
Art	2	Student applies principles of art
Art	3	Student uses materials and techniques to create works of art

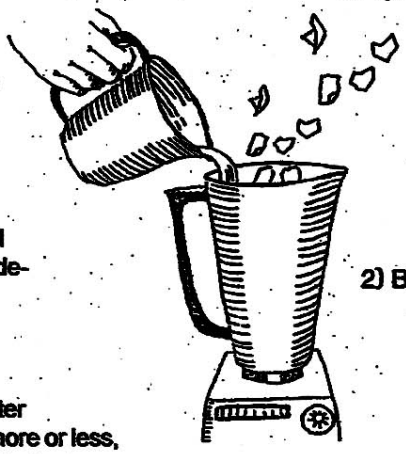
Making Paper From Paper

Make recycled paper by using the following procedure:

1 Tear sheets of used paper into small strips, about one-inch square. Loosely pack into blender until 1/3 to 1/2 full. Add warm water until blender is 2/3 full. It is also helpful to add a pinch or two of dryer lint, to improve the texture of the paper.

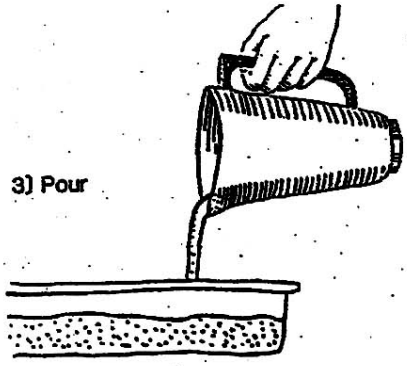
1) Rip Up

2 Blend (with lid on) until the paper looks like oatmeal mush (5-10 seconds). If you are coloring the paper by using scraps of construction paper, add them now. (If you desire white paper, add a small amount of dish washing detergent to de-ink the paper.)



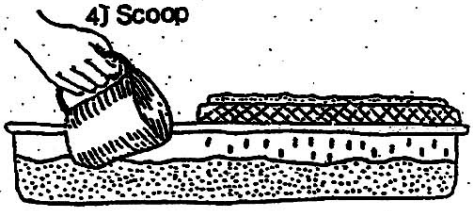
2) Blend

3 Pour into a pan. When pulp is mush consistency, add about 1/2 inch of water for every blender-full of pulp, adding more or less, depending on the thickness of paper desired.



3) Pour

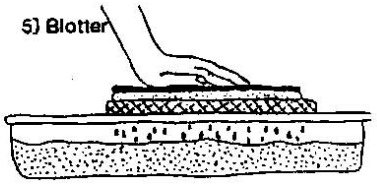
4 Scoop the pulp mixture evenly onto the screen with a cup (hold the frame over 1/2 of the pan). If students want to add things individually to their pulp (colors, paper bits, glitter, spices) they add it to their cupful. Let the pulp drain.



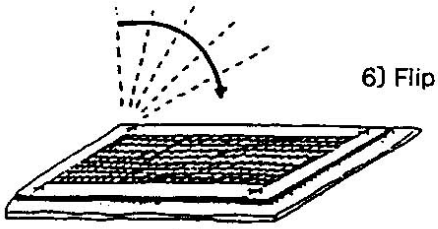
4) Scoop

Making Paper From Paper
Page 2

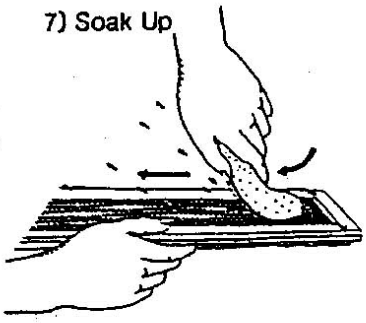
5 Place a piece of blotter over the wet sheet of paper on the screen, then flip the screen over the so the paper is between the blotter and the screen, with the screen on top.



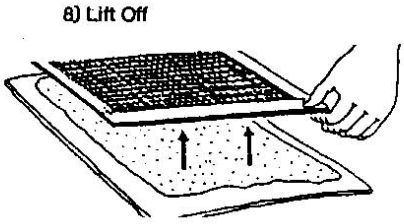
6 Soak up extra water with a sponge. This water can be squeezed out of the sponge back into the pulp mixture.



7 Lift off the screen and place the new paper in a safe place to dry. Drying takes one or two days. Exchange blotter and dry paper towels every few hours, if you want the paper to dry more quickly. The paper should not be touched or unnecessarily disturbed while drying. You may iron the paper to speed up the drying process; place a sheet of paper between the new paper and the iron.



8 For special effects, you may use cookie cutters to create unusual shapes for your paper, or you may add glitter or food coloring to the mixture.



Source: Association of Vermont Recyclers: *Teacher's Resource Guide for Solid Waste and Recycling Education* (1999)

Paper Trash Tracking

Teacher Worksheet

Background

This activity is the first of three trash-tracking activities in this series of lessons and it is the easiest for students to follow. It is a straightforward conceptual approach recycling. Students separate material for recycling from other waste products and track them. Students also learn the concept of indirect weighing. The container holding paper is weighed by using a bathroom scale and a student holding the recyclable paper. The empty container is reweighed with the same student holding the container. Subtraction yields the weight of the paper.

Students in this activity will track and recycle paper over a 3-week period, keep records, and then extrapolate their findings for the entire school and for the school year.

(Optional) A teacher may elect to continue paper recycling over a longer period and use the formula that recycling 150 lbs. of paper waste saves about one tree from being cut. A poster with cut-out trees showing how many trees have been saved is a good visual display.

Materials

- A labeled cardboard or plastic box to put on the floor next to the classroom trashcan for collecting classroom paper for recycling A bathroom scale
- Some rubber gloves may be needed depending on the students
- Copy of the overhead “Don’t Throw Your Trees Away.”

Procedure

Prepare by determining the best way in your community to recycle paper. You certainly want the recycled paper gathered to be productive. Students should know what happens to the paper they gather. (A list of recycling centers, the materials accepted, and locations are included in the introductory materials accompanying these lessons. Local contacts are also listed to call to verify that the list is up to date.)

Set up the labeled container in the classroom and coach students in its proper use. All paper belongs in the recycling box, but no plastic, gum, popsicle sticks, etc. Avoid any paper contaminated with food or liquids.

Consider appointing students in groups to monitor the recycling box each week. Someone in the group weighs the paper at the end of the week using the indirect method described above.

Every 150 pounds of paper recycled equates to about one tree being saved. Use the overhead, Don't Throw Your Trees Away to explain the relationship between trees and paper and how paper may be made from recycled paper or trees. A classroom display showing how many trees they have saved through recycling is a nice visual.

Have students record the data and answer the questions on their worksheets. They need help with the math.

Colorado Educational Standards Supported

Geography	5.3	The student will describe the role of resources in daily life
Mathematics	1	Students use numbers in problem solving situations
Mathematics	6	Students use proper algorithms while problem solving with whole numbers
Science	5	Students describe resource-related activities in which they could participate to benefit their communities

Paper Trash Tracking

Student Worksheet

1. Record the weight in pounds of the recycled paper saved by your class for three weeks:

Week 1	Week 2	Week 3

Total Weight Paper Recycled for 3 Weeks _____

2. Recycling about 150 pounds of paper keeps one tree from being cut. How many trees did your class save?

3. How many classes are there in your school? _____

4. If everyone in your school recycled as much paper as your class, how many pounds would your school recycle in three weeks?

5. At that rate, how many trees would your school save in three weeks?

6. Suppose the whole school recycled paper all school year. How many trees could your school save? (Hint: most schools have about 36 weeks in one school year)

Sarah Cynthia Sylvia Stout

(Adapted from Wrap Sessions: Town of Islip Recycling Curriculum, Department of Environmental Control, Town of Islip, NY. Poem Courtesy of the Estate of Shel Silverstein)

Teacher Worksheet

Background

This poem that follows on page 2 by Shel Silverstein is about how Sarah Sylvia Cynthia Stout acts and feels about garbage. As students listen to the teacher read the poem aloud, they will fill in the worksheet or respond aloud to the questions on the worksheet. Students should develop awareness of the amount of garbage produced and attitude toward it.

Materials

- Pen or Pencil
- One worksheet per student

Procedure

Read the poem that follows on pages 2 and 3 to the class and ask them to complete the questions on the worksheet. Determine whether the class understands the concepts of recycling material and composting food scraps before they start on the worksheet. You may need to read the poem twice.

Optional Exercise

Draw a picture of what you think Sarah Cynthia Sylvia Stout and her house look like.

Colorado Educational Standards Supported (K-4)

Geography	5.3	Student studies use and importance of resources
Science	5	Student engages in resource-related activities that benefit community
Reading and Writing	1	Student uses strategies to comprehend poetry
Reading and Writing	4	Student responds to written and oral presentations
Reading and Writing	5	Student selects and makes use of information

Sarah Cynthia Sylvia Stout

By Shel Silverstein

Sarah Cynthia Sylvia Stout
Would not take the garbage out.
She'd wash the dishes and scrub the pans,
Cook the yams and spice the hams,
And though her parents would scream and shout,
She simply would not take the garbage out.
And so it piled up to the ceiling:
Coffee grounds, potato peelings,
Brown bananas and rotten peas,
Chunks of sour cottage cheese.
It filled the can, it covered the floor,
It cracked the windows and blocked the door,
With bacon rinds and chicken bones,
Drippy ends of ice cream cones,
Prune pits, peach pits, orange peels,
Gloppy glumps of cold oatmeal,
Pizza crusts, and withered greens,
Soggy beans, and tangerines,
Crusts of black-burned buttered toast,
Grisly bits of beefy roast.
The garbage rolled on down the halls,
It raised the roof, it broke the walls,
I mean, greasy napkins, cookie crumbs,
Blobs of gooey bubble gum,
Cellophane from old bologna,
Rubbery, blubbery macaroni,
Peanut butter, caked and dry,
Curdled milk and crusts of pie,
Rotting melons, dried up mustard,
Eggshells mixed with lemon custard,
Cold French fries and rancid meat,

Yellow lumps of Cream of Wheat.
At last the garbage reached so high
That finally it touched the sky,
And none of her friends would come to play,
And all the neighbors moved away:
And finally, Sarah Cynthia Stout
Said, Okay, I'll take the garbage out!
But then, of course it was too late,
The garbage reached across the state,
From New York to the Golden Gate:
And there in the garbage she did hate
Poor Sarah met an awful fate
That I cannot right now relate
Because the hour is much too late.
But children, remember Sarah Stout,
And always take the garbage out.

Sarah Cynthia Sylvia Stout

Student Worksheet

This is a poem about Sarah Cynthia Sylvia Stout and how she feels about garbage. As you listen to your teacher read the poem aloud, fill in the first section of the questions below.

Section 1 - Listening

1. Name 5 pairs of words in the poem that rhyme (Example: mustard - custard)

2. Name 5 things that represent garbage (Examples: rotten peas, curdled milk)

3. Name 5 words that name places. (Examples: roof, walls)

4. List 5 words that show action. (Examples: scream, shout)

Section 2 - Circle the best answer

5. Sarah Cynthia Sylvia Stout hates
    A. Garbage
    B. Food
    C. School

6. She is very
    A. Smart
    B. Lazy
    C. Silly

7. Most of the garbage in this poem is made of
    A. Dead leaves
    B. Old clothes
    C. Rotten food

8. The garbage is so bad that it
    A. Is taken to the dump
    B. Piles up to the sky
    C. Is burned and buried

Section 3 - Fill in the missing words

9. When Sarah would not take out the garbage, her father would _____ and _____.

10. The messy food filled the _____ and _____ of the floor.

11. Two kinds of fruit that were rotting were _____ and _____.

12. A word that describes rotten meat is_____.

13. The garbage spread from _____State to the Golden Gate.

Section 4 - Sentence Answers

14. What is Sarah Cynthia Sylvia Stout's problem? _____

_____

_____

_____

15. List 10 things in the poem that mean garbage. Can this kind of garbage be composted or recycled? Circle the word.

1) _____ Recycle Compost

2) _____ Recycle Compost

3) _____ Recycle Compost

4) _____ Recycle Compost

5) _____ Recycle Compost

6) _____ Recycle Compost

7) _____ Recycle Compost

8) _____ Recycle Compost

9) _____ Recycle Compost

10)_____ Recycle Compost

16. What happens when Sarah Cynthia Sylvia Stout will not throw the garbage out?

_____

_____

_____

_____

17. What would have happened if she had composted her food scraps?

_____

_____

_____

What's In A Landfill?

(Adapted from Nutrition Comes Alive, A Case of Waste, By The Division of Nutritional Sciences, Cornell University)

Background

Different materials require different amounts of time to decompose. The purpose of this activity is to show this inductively to students. Students will also discover that decomposition of inorganic waste takes a very long time

Materials

- If you do this as a class project, an empty aquarium works well.
- If students do this in groups, each group will need a large mouth glass or plastic jar or even a large cottage cheese container will suffice.
- Students supply their own 5 pieces of "trash". The pieces should be no more than about 1" in size.
- You will need enough dirt to fill containers about 2/3 full. Use regular topsoil and not potting mix.
- Newspaper or tarp for dumping materials after the materials have aged.

Procedures

1. On the day before the start of the activity, tell students to bring 5 small pieces of "trash" to class. Encourage them to be creative so that they will be able to recognize their pieces of trash at the end of the activity. You can decide if kitchen or yard waste is OK, but certainly no bathroom waste.
2. On the day of the activity start by having them list their items on their student worksheet and briefly describe them.
3. Fill the container about half-full of soil, pack it down, and students add their items to the "landfill".
4. Cover with more soil and pack it. Sprinkle with water so that it is damp but not soggy. Then cover the container. Plastic wrap or even a piece of cardboard will work if there is no lid.
5. Put on the window sill or other warm location and leave in place about 2 weeks.
6. At the end of the aging process, have students dump contents of the container onto newspapers or a tarp. Have the students look for changes in their items and record them.
7 (Optional) You can reassemble the landfill and let it sit as long as you want.
8. At the end of the activity, hand out "**When Will Things Decompose?**" It explains why many items showed little or no change.

Vocabulary

Decompose: To decay or rot; come apart; change form; breakdown into simpler components

Landfill: A disposal facility at which solid waste is placed on or in the land, usually in a controlled manner

Trash: Worthless or discarded material; synonyms: refuse, garbage, rubbish, waste.

Colorado Educational Standards Supported K-4

Geometry	5.3	Student will describe the role of resources in daily life
Science	1	Students communicate about investigations
Science	2.1	Students examine, describe, and compare objects in terms of physical properties
Science	5	Students describe resource-related activities in which they could participate to benefit their communities

What's In a Landfill?

Student Worksheet

Name_____ Group_____

List below the 5 things you brought to add to your "landfill."

Write your items in the table below and describe them. (Color, Shape, Size, Markings, Texture, Smell)

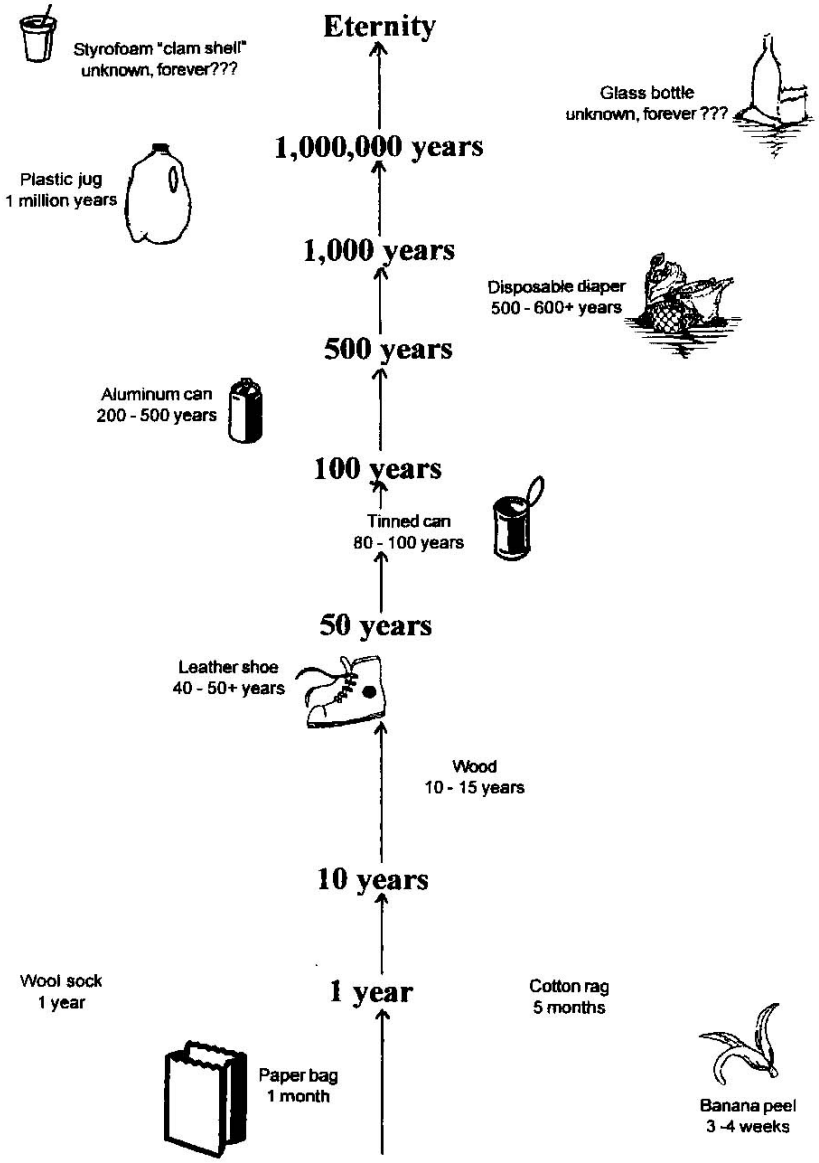
At the end of the activity describe them in the second column. Look for changes.

Item	Appearance at the start	Appearance After

1. Did any things change a lot? Tell which and how they changed

2. Which things did not change very much?

When Will Things Decompose ?



A Lot of Garbage

(Adapted from: Rethinking Recycling: An Oregon Waste Reduction Curriculum, Oregon Department of Environmental Quality)

Teacher Worksheet

Background

If students are going to help solve the garbage (waste) problem, they first need to understand the size of the problem. Throwing away a single gum wrapper or a banana peel does not seem very important, until we see the cumulative of everyone's combined trash over a period of time. By performing a classroom waste audit, students will gain the necessary perspective to realize that everyone's individual waste contributes to solid waste management problems. A secondary goal of this activity is to help younger students see the impact recycling and composting can have on the problem.

Materials

- Each student will need one 15-30 gallon plastic garbage sack. The kind with the drawstring is best
- Each student should also have a 1-gallon bag in which to put wet waste and food scraps.
- A bathroom scale
- When the students do the audit, they each should have a tarp or some newspapers on which to spread the garbage.
- Each student will need a garbage audit sheet and a student worksheet.
- An overhead transparency of the audit sheet will speed things up.

Procedure

At the start of the day, hand out to each student both a large bag and a small bag. The small bag will be carried inside the large bag and is for disposal of food items. Put a cover on the classroom trashcan and the classroom-recycling box as a reminder. Instruct students that for the next 24 hours they are to collect their own garbage in their sack. NO SHARP ITEMS OR BATHROOM WASTE. Students will take their bag home with them at the end of the school day and bring it back when they return tomorrow.

On the following day, the class will do an audit of the trash. This is best done in a large room. Start by having each student get the total weight of his/her trash. The best way is for them to weigh themselves on a bathroom scale while holding the bag and then again without, and then subtract.

Now have the students spread out their tarp or newspapers on the floor and dump out their garbage. Sort it by the categories on the audit sheet. Then designate groups of students to go around the room and gather each type of trash on the audit sheet separately into as many bags as

needed.

Use the same weighing strategy as above to get the total class weights for each trash category. Have all the students in class record the numbers on their own trash audit sheet.

Check ahead with your local solid waste disposal program to see which things can be recycled in your area. (This information appears in the introductory section of this set of lessons). Have boxes already set up so that collected recyclables can be put in containers. Then go through the process of weighing the class garbage with the recyclables removed. Assume all food wastes can be removed for compost and treated as a recyclable.

Have the students do the questions on the worksheet and turn them in with their audit sheet.

Colorado Educational Standards Supported

Geography	5.3	Students know the importance of resources
Science	1	Students select and use simple devices to gather data
Science	5	Students can describe resource-related activities that will Benefit the community
Mathematics	1	Students will use numbers in problem solving situations
Mathematics	3	Student constructs and interprets displays of data
Mathematics	5	Students use and estimate measures of weight
Mathematics	6	Students demonstrate use of appropriate algorithms In problem solving

A Lot of Garbage Student Audit Sheet

Name _____

	Pounds Before Recycling	**Pounds After Recycling**
Paper	_____	_____
Wood /Yard Debris	_____	_____
Food	_____	_____
Plastics	_____	_____
Metal	_____	_____
Glass	_____	_____
Carpeting/clothing	_____	_____
Miscellaneous	_____	_____
Class Total	- - - - - -	- - - - - - -

A Lot of Garbage
Student Worksheet

Name_____ Class_____ Weight of my garbage_____

1. What was the average weight of garbage for students in your class to the nearest pound? (Divide the total weight for the room by the number of students)

2. Did you produce more or less garbage than the average student? How much more or less?

3. If you continued to produce garbage at this rate, how much would you make in one week, one month, and one year. (Hint: 1 week = 7 days, 1 month = 30 day, 1 year = 12 months)

4. How much garbage would be produced by your class in one year ?

5. How many classes are in your school? _____ How much garbage would the whole school produce in a year?

6. Now let's assume you all recycle the best you can. Use the second set of numbers on your audit sheet to redo question 1.

7. How much garbage would your school save if everyone recycled?

Composting in a Jar

(Adapted from: Rethinking Recycling: An Oregon Waste Reduction Curriculum, Oregon Department of Environmental Quality)

Teacher Worksheet

Background

Composting organic waste is a natural process of aerobic decomposition that allows nutrients in organic material to return to the soil and enrich it for plant growth in the future. Bacteria, fungus, and worms all help in the composting process. In the presence of air and moisture these organisms decompose plants, releasing energy in the form of heat.

Composting is an excellent way of "recycling" organic waste at home and at school in order to keep this valuable carbon-rich material from entering the landfill where it can no longer be used by nature. In fact, organic material entering a landfill will gradually break down, but under the anaerobic conditions of a landfill, methane gas will form as a by-product. Methane is known to contribute to global warming and is an environmental management issue at landfills because it causes fires and explosions if improperly controlled. Thus, keeping organic wastes out of landfills not only benefits the environment, it makes the landfills easier and safer to manage.

Materials

- A large clear wide mouth plastic or glass jar for each group of students
- An ample supply of fertile soil (not potting soil, which is sterile)
- The students will be asked to supply the organic waste (kitchen or garden compost) for their jars, but it will help to make prior arrangement with the kitchen staff or maintenance people in case there is a problem
- A 12" ruler for each group
- A thermometer for each group
- 2 sheets of graph paper for each student (or one sheet of reversible)
- A hand lens for each group

Procedure

Prior to starting this activity, assign students to groups and determine if they will compost garden waste, kitchen waste, or a combination of the two.

Kitchen compost can be a mixture of some or all of the following: vegetable peels and seeds, fruit peels and seeds, coffee grounds, eggshells, nut shells, any other vegetable or fruit scraps. (Avoid using meat scraps, bones, dairy products, oil, or fat. They may attract pests.)

Garden compost can be a mixture of some or all of the following: hay or straw, grass clippings, leaves, ashes, sawdust, wood chips, or weeds.

On the starting day of the activity, students will set up their jars. Begin with a layer about 2" of soil. Moisten it, but do not soak it. Add materials to be composted in repeating layers with dirt. Add small amounts of water to make materials moist, but not soaked. Finish with a 1" layer of dirt. (You may make a few points with the custodian if you arrange to do this activity outside.)

Take the temperature of the materials in the jar and measure the height in inches. Record as the first column readings on the student worksheet.

Set the jars on a windowsill and monitor the heights and temperatures every other day over a two-week period. Record measurements in the chart and moisten the mixture a little after measurements are taken. Try to keep things damp, but not mushy.

At the end of the first week have the students stir up their mixture with a long-handled spoon and remove a little from the jar to examine with a hand lens. Have them record what they see. Repeat at the end of the second week. (This activity can go longer, but 2 weeks should be long enough to see results.) Students are asked on their sheets to graph the heights and the temperatures over the time of the activity. They are also asked to draw a few conclusions and speculate what is happening.

Plan at the end of the activity for disposal of the composts. Perhaps the school has a pile already or you can start one. At least arrange for a parent to take the compost home if they wish to do so.

Vocabulary

Compost: (verb) To help the decay or decomposition of organic matter (like grass, leaves, food).

Organic material: Living or once living substances such as food, leaves, grass, etc.; scientifically refers to matter that contains carbon, hydrogen and oxygen.

Aerobic: The state of having oxygen, for example, for healthy composting, aerobic conditions are necessary.

Bacteria: The tiny microorganisms or “bugs” that are useful in composting because they break down organic matter. However, bacteria can also be unhealthy, such as the kind that grows on garbage and litter.

Organisms: Living individuals, plants and animals.

Biodegradable: capable of being broken down into simple substances or basic elements by microorganisms.

Decompose: to decay or rot; come apart; change form; break down into simpler components.

Colorado Educational Standards Supported

Geography	5.3	Student will describe the role of resources in daily life
Science	1	Student selects and uses devices to gather data
Science	2.1	Student measures common physical properties
Science	2.3	Student describes an observed change
Science	5	Student can describe a resource-related activity in which they Can participate to benefit the community
Mathematics	3	Student constructs and interprets tables and graphs
Mathematics	5	Student knows and uses common measures

Composting in A Jar

Student Name _____ Group Name_____

Type of Compost_____

Keep track of the height and temperature of your compost jar by date in the chart below.

Date							
Height							
Temp							

1) Look closely at the contents of your jar after one week using a hand lens. Record what you see.

2) Look closely at the content after two weeks again with the hand lens. Record what you see.

3) At the end of the second week, get two pieces of graph paper. Make two line graphs, one to show the height and one to show the temperature of your compost mixture by dates.

4) Describe how the height changed over the two weeks.

5) Describe how the temperature changed over the two weeks.

6) What do you think was taking place in your jar?

7) In your class, which type of compost (kitchen, yard, or combined) changed the most?

Put your name on the graphs and staple your graphs to this sheet and turn them in, and then follow your teacher's directions to clean up your experiment.

Landfill In a Jug

(*Adapted from Rethinking Recycling: An Oregon Waste Reduction Curriculum, Oregon Department of Environmental Quality)*

Teacher Worksheet

Background

Almost all garbage is eventually disposed in a landfill. “Modern” landfills are called sanitary landfills because they are lined with thick plastic and clay layers and have leak monitoring systems to protect the groundwater. Older unlined landfills continue to be a source of environmental pollution and we must continue to clean them up until they no longer exist.

Landfills are monitored for two reasons. First to control methane build-up, which can cause fires and explosions, and second, to control “leachate” which can leak out of the landfill. New technology now allows the “harvest” of methane and use of it as a source of energy.

The control of leachate is more difficult and complex. It can carry undesirable compounds and pollute surface and ground water. Modern landfills deal with the leachate problem in one of two ways. Some monitor the leachate and if it is hazardous it is processed the same as any hazardous waste. Other landfills “recirculate” leachate through the landfill to speed up decomposition of garbage.

In this activity students in groups will assemble and fill a model of a landfill. They will add to their model a few crystals of colored indicator (red food coloring works - but not as well). After about a 2-week period the landfill will be disassembled. Garbage items will be checked for changes and the groundwater will be checked for evidence of pollution.

Materials

- A one-gallon milk jug for each group
- 6 cups soil per group
- 1 sheet blue construction paper per group
- Varied plastic bags to use as liners for the landfills: Ziploc bags, grocery store bags, garbage bags, and if possible a few very light bakery-type bags.
- Phenolphthalein indicator crystals (from a chemical supply house). Use a very small amount per group (less than 1/8 tsp) or you can use 8-10 drops per group of red food coloring.
- Masking tape
- Rubber gloves - 1 pair per group
- A piece of a bar of soap per group

Procedure

On the day before the activity, instruct the students to bring in 7-10 items they will add to their landfill. Keep them small – a maximum 1" in size

- Using a large pair of scissors cut the bottom of the jug from the top (see diagram on the following page). Cover the cut edge of the jug with masking tape for safety.
- Cut out a piece of blue construction paper that will fit in the bottom of the jug. Set it in.
- Cover with soil till jug is 2/3 full. Pack it down.
- Dig a wide hole in the dirt that goes down to about 1" from the bottom. This is the landfill site. Save the dirt for later
- Line the hole with plastic. Trim it so that it does not extend above ground level.
- Sprinkle in the phenolphthalein crystals or the food coloring. Add the piece of soap.
- Students now add garbage and soil in alternating layers. End with about 1" of dirt on top. When done, pack it down tightly
- The landfill needs to sit about 2 weeks. It should be "rained on" a couple of times each week enough to get the soil good and wet.

At the end of the 2 weeks, the students will open up their landfill. (It should be done by one person in the group wearing latex gloves so that skin is not stained.) Each student describes his/her "garbage" and the group looks for evidence of leachate (red stains on their blue paper).

Students may notice their garbage changed very little. Consider showing them the overhead: When Will Things Decompose on the final page of this worksheet.

Vocabulary

Decompose: To decay or rot; come apart; change form; break down into simpler components.

Landfill: A disposal facility at which solid waste is placed on or in the lan, usually in a controlled manner.

Sanitary Landfill: A site designated for the burial of wastes in which the wasteis spread out, compacted and covered with a layer of dirt. The site is constructed to reduce hazards to public health and safety, and under federal law must include an impermeable lower liner to block the movement of leachate into ground waste, a leachate collection system, gravel layers to control methane, and other features.

Leachate: Liquid that has percolated through solid waste and/or been generated by

decomposition of solid waste, containing dissolved, extracted, or suspended materials that are usually toxic.
Liner: A thick protective layer made of industrial strength plastic that is placed in landfills to keep leachate away from groundwater.

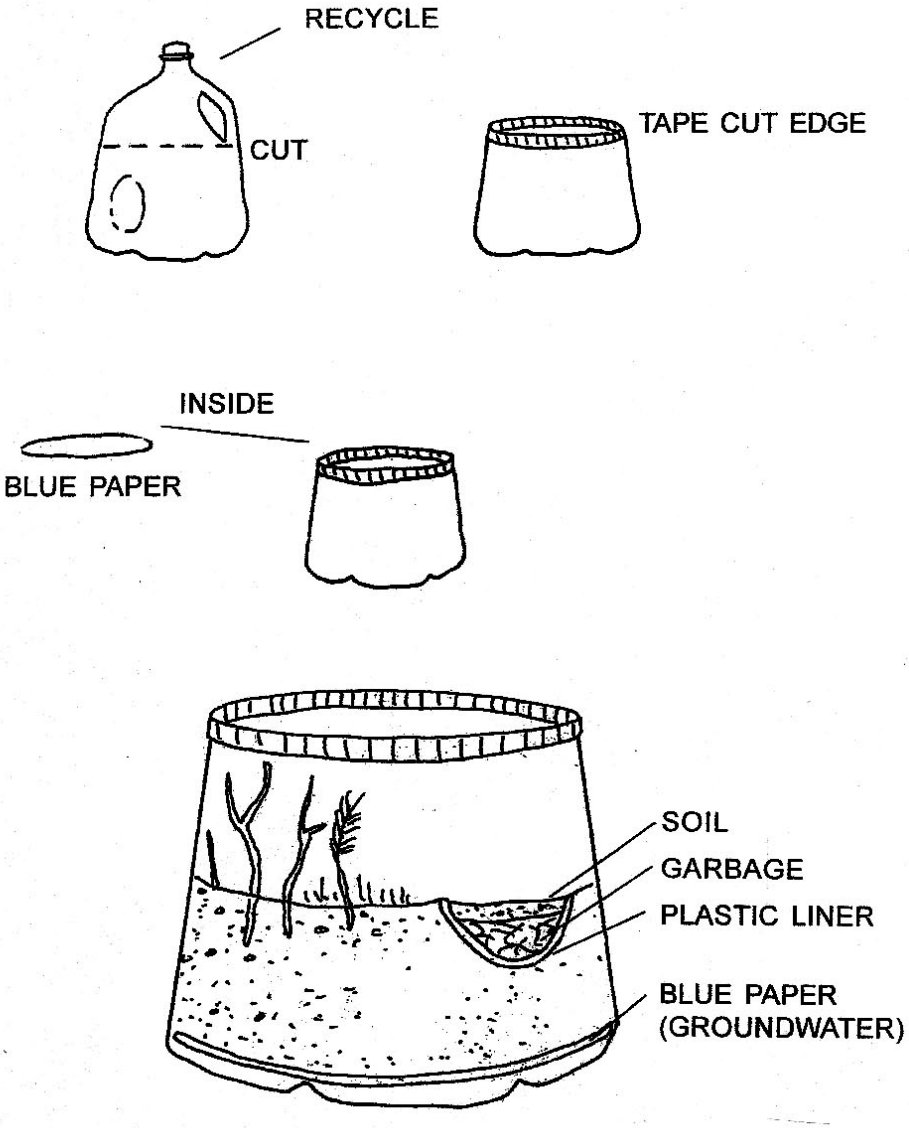
Monitor (verb): Observe or check the progress (of something) over a period of time; keep under systematic review.

Methane: A chemical created when organic materials are broken down under conditions without oxygen, such as in a landfill.

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in daily life
Science	5	Students will describe resource-related activities in which they could participate to benefit their communities.
Science	1	Students use data based upon observations to construct a reasonable explanation

Landfill In A Jug Diagram



Source: California Integrated Waste Management Board: *Closing the Loop: Exploring Integrated Waste Management and Resource Conservation K-6* (2000)

Landfill In a Jug
Student Worksheet

Name _____

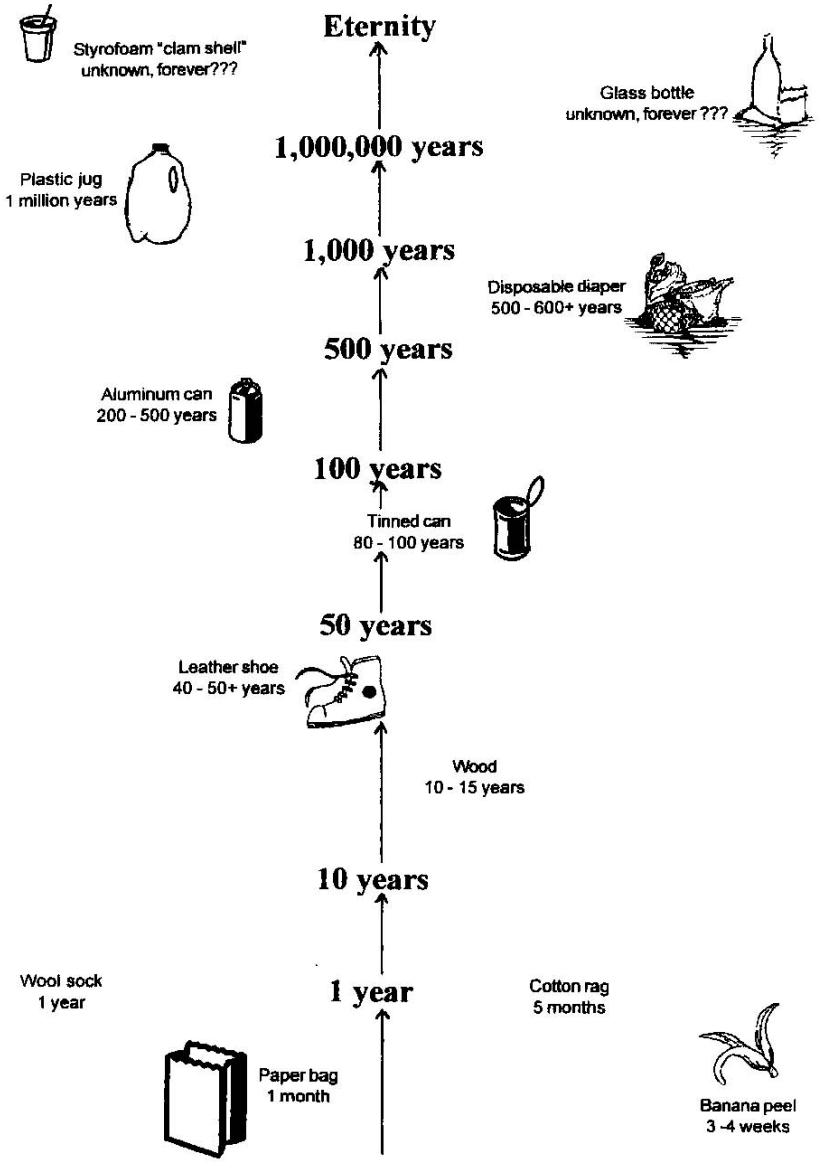
1. In the table below describe changes you saw in the items you put in your landfill

Item	**Changes**

2. Did your landfill have a leachate (liquid coming from the waste) problem? How do you know?

3. Tell what your group did right or what you did wrong with regard to leachate.

When Will Things Decompose ?



The Lorax

(*Adapted from Classroom Activities, Department of Economic and Community Development, Augusta, ME)*

Teacher Worksheet

Background

In The Lorax, Dr. Seuss introduces "The Once-ler", who cuts down the beautiful Truffula trees so that he can use their wonderful silk tufts to knit "Thneeds". Sales are so successful that the Once-ler builds a factory and invents a "super axe hacker" which cuts down four trees at a time. The Lorax speaks up in defense of the trees, animals, air, and water that the Once-ler is destroying in pursuit of bigger and bigger profits. Finally, when the last Truffula tree is cut down, production of Thneeds ends. Closed factories, polluted air, polluted water, and uninhabitable wasteland are all that remain on the once beautiful site. The Lorax can no longer live here, but he leaves behind a small pile of rocks on which the word UNLESS is inscribed.

The Lorax illustrates an ecosystem, a natural unit in which living and non-living things interact.. All of the parts are linked together and function as a unit. When one of the parts is altered or damaged, the entire system may fail.

Materials

- Each student should have a copy of the book. Because of copyright laws, a copy of the book is not included, making it necessary to rely on the school library for copies. As an alternative the teacher may read the book aloud to the class and allow them time to write out answers to the worksheet questions.
- In many areas a video of The Lorax is available

Procedure

Students should read or have read to them The Lorax, and then complete the questions on the student worksheet individually.

Colorado Educational Standards Supported

Science	3.2	Students recognize the interrelationships of organisms
Science	5	Student describes advantages and disadvantages that may arise from introduction of new technology
Read/Write	1	Students comprehend written materials
Read/Write	2	Students are able to write for audiences
Read/Write	4	Students are able to make conclusions and predictions related to stories
Read/Write	6	Students read and respond to a variety of literature

The Lorax by Dr. Seuss

Student Worksheet

1. Why did the Once-ler cut down the Truffula Trees?

2. Why do you think the Super Axe Hacker was invented?

3. Why did the Brown Bar-ba-loots have to leave?

4. Name at least three problems the Thneed factory causes for the environment.

5. Why do you think the Once-ler ignored the warnings of the Lorax?

6. What happens to the Once-ler when there are no more Truffula trees?

7. What happens to the Lorax?

8. What things could the Once-ler have done to minimize the effect of the factory on the environment?

9. Thneed was defined as a fine thing that everyone thinks they need. Give some real life examples of "Thneeds".

10. On another piece of paper write your own ending to the story starting with the word, UNLESS.

The Birds of Zazurds

Teacher Worksheet

Background

The Birds of Zazurds is an activity taken from Pathways to a Sustainable Future: A Curriculum Guide For Schools Exploring Waste management Issues, The Chewonki Foundation, Wiscasset, Maine (www.chewonki.org). "Birds" is one of a number of worthwhile activities that can be used in the classroom. The Foundation has given permission to use this activity and reproduce classroom sets. The understanding is that all uses will be not-for-profit.

The activity is written in the spirit of Dr. Seuss and introduces students to some basic waste issues. There are follow-up activities in the accompanying materials that follow that may help students relate the issues to their own school and community.

Materials

- You will need copies of the story for your students
- You will need to design a follow-up sheet appropriate for your students. The accompanying materials suggest questions.

Procedure

Read the story in class. There are two designated breaks for discussion that may or may not be used. At the end of the reading is a list of discussion questions, which the teacher may use as a resource for a written assignment or group work. There are also some optional extension activities that the teacher may use based upon the interest and level of the class.

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in daily life
Reading/Writing	1.	Students use a full range of strategies to comprehend poetry and short stories
Reading/Writing	2	Students write stories with supporting detail
Reading/Writing	4	Students use reading skills to answer questions
Reading/Writing	6	Students read and respond to a variety of materials

The Birds of Zazurds

A Story About Waste and Action

by Andy Barker
illustrated by Josephine Ewing

Level
- ● ***Beginning***
- ■ ***Intermediate***
- ◆ ***Advanced***

"The Birds of Zazurds" may seem too advanced for some Kindergarten and First Grade classes. The Lorax by Dr. Seuss is an alternative introductory story to introduce the issues of caring for the environment and looking at our behavior.

Advanced level students may be motivated by anticipating a presentation to younger students

The Birds of Zazurds introduces students to some of the basic waste issues of our time. Written in the spirit of Dr. Seuss, the story takes the Zazurds Backwards Flutter Birds from their idyllic origins in the Gulligut tree, to their environmental crisis, the big crack. Students suggest solutions as the new generation of Birds comes to grips with their problem. Follow-up activities help the students relate the Birds' experience to their own school and community. The Birds of Zazurds Play gives intermediate students the chance to share the story with younger classes.

This story can raise many additional environmental issues for students. The discussion questions do not address the obvious population problems created by the Birds. Teachers are encouraged to explore topics of interest with students even if they are peripheral to the topic of solid waste.

Overview

The story is a good beginning for most classes to look at waste issues in general and see what problems they have around them. Reading the story will motivate students to ask "What about us?" The discussions and activities will get them to start thinking "What can we do?"

Time Planning

The story takes about 30 minutes to read, including the two breaks for discussion. This may vary according to the age group. Some teachers of young students prefer to break in the middle of the story, then complete the reading and discussion later.

The final discussion takes about 10 minutes.

Plan a separate period(s) for the follow-up activities.

Discussion

First Discussion Session

After the line ...It saved lots of time which let them relax.

1. What are the major problems facing the Birds?
2. Who (or what) is responsible for these problems developing?
3. What do you think might happen next?

Second Discussion Session

After the line ...They flocked to the tree and they held a great meeting.

1. Why are the Birds having a meeting?
2. What are the problems now? (add ideas to the list)
3. What solutions do you think will help the Birds?

Final Discussion

If there was no discussion during the story, use the factual questions above to begin the final discussion.

● Beginning

1. What things did the Birds do to create their problem?
2. Was there a problem when there was only one nest? How did more nests and more birds make the problem worse?
3. What were the other problems facing the Birds?
4. What solutions did the Birds devise? Were they the same as yours? What other suggestions would you have for the Birds to solve their waste problem?
5. Why was it important for the Birds to change the way they threw things away? What other things did they have to do differently? Why wouldn't it have worked to have someone just take the mess "away"?
6. How did the solutions to the problems change the Birds' lives? Did it make their lives easier or harder? Was their life better? How?
7. What was special about the Gulligutt tree? Why did the young Birds return to the tree?
8. How are the Birds of Zazurds like people? How is the Gulligutt tree like your school? Your home? Your town?
9. Do people in your classroom (your school, your family) do things that might harm your Gulligutt tree?

■ ◆ Intermediate and Advanced

1. When did the Birds' trash become a problem? Why wasn't it a problem before that?
2. So, was Jack right at the time when he said, "I see no problem here."?
3. What were the effects of increasing population?
4. How did the Birds' behaviors make their lives easier?
5. What solutions did the Birds devise? Were they the same as yours? What other suggestions would you have for the Birds?
6. How are the Birds of Zazurds like people? How is the Gulligutt tree like our homes and community?
7. How are the trash problems of the Birds like the problems people face?
8. What can we learn from the Birds of Zazurds?
9. If you went with B.J. McFife on his next secret trip to Zazurds, what do you think you would find? How might the Birds have changed since the end of the story?
10. Where do you think Zazurds is? Where is Zife? Who do you think B.J. McFife is?
11. Describe the narrator. How is the narrator like you?
12. Who is your favorite character? Why?

PATHWAYS TO A SUSTAINABLE FUTURE

Our School, the Gulligutt Tree

The Birds of Zazurds

Overview

This is a project where students make drawings to compare the Gulligutt tree and their school. The drawings show how the Birds of Zazurds and people dispose of their waste.

Level
● Beginning

Materials
drawing paper
crayons

Objectives

Students will compare the Gulligutt tree to their school and identify wasteful behaviors.

Management Suggestions

1. Arrange a short "field trip" with the custodian to the dumpster and recycling area so students can see where the classroom (cafeteria, teacher's room, office) trash goes. Have the custodian describe where the trash goes from there.
2. Use the discussion following the story to focus the ideas for the drawings.
3. Consider doing small group drawings or a single class mural.

Procedure

1. Read the Birds of Zazurds and discuss the story using the discussion questions.
2. On a flip chart or on the board, make two columns: on one side brainstorm a list of items the Birds threw away, on the other side make a list of things that are thrown away in the school. Compare the lists and discuss similarities.
4. Take a quick trip with the custodian to see where trash from the classroom (and other parts of the school) goes. Are things being done to reduce the amount of trash thrown out?
5. Have students fold drawing paper in half. Label one side "The Gulligutt Tree" and the other side "Our School." Have them draw/color the tree and the school showing the trash produced and disposed of in both places.

Discussion

1. Compare the Gulligutt tree to the school.
2. How are the Birds' habits and your habits similar? Different?
3. How are the tree and the school important "habitats"? Why do we need to care for them?
4. What waste problems do we have in the school?
5. The Birds changed how they did things. Are there things we could do differently?

PATHWAYS TO A SUSTAINABLE FUTURE

The Birds of Zazurds

The Birds of Zazurds Play

Level
■ Intermediate

Materials
costumes and props the students devise

Overview

Students dramatize the Birds of Zazurds and put on a play for younger classes.

Objectives

Students will interpret the story of the Birds of Zazurds, relate the story to their own lives and produce a play which demonstrates their understanding.

Management Suggestions

1. Arrange (or have students arrange) with other teachers to perform the play for younger classes in the school. The play might be presented to parents or taken "on the road" to other schools.
2. Avoid writing out lengthy scripts by making copies of the story. Have narrators and characters underline their lines.
3. More advanced groups may want to write more dialog into the story.
4. Try to have a part for each student. Several students can share the part of the narrator.

Procedure

1. Read the story and discuss it to process student understanding of the allegory and help the students relate the Birds to their own lives.
2. Plan the play with students:
   - List the characters
   - Decide who will take each part, including narrator(s) and "extras"
   - Divide the story into "scenes"
   - Brainstorm ideas for props and costumes that would go with each scene
   - Decide on what dialog will be included in each part
   - Experiment with actions that can convey meaning to the story
3. Gather props and costume materials.
4. Practice the play and logistics for putting the play on for others.
5. Plan for discussion with the audience following the play - have students plan appropriate questions.
6. Present the play and facilitate discussion with the audience.

Discussion

1. Discuss how the students' understanding of the story has changed after presenting the play to other groups.
2. Brainstorm action steps the students might take to avoid developing problems with waste in school.

PATHWAYS TO A SUSTAINABLE FUTURE

Zazurds II

Overview

Students write and illustrate a sequel to the story Birds of Zazurds.

Level

◆ **Advanced**

Materials

materials for writing and drawing

Objectives

Students will analyze the Birds of Zazurds and create a story line which develops the concepts of waste management into another time.

Management Suggestions

1. Arrange (or have students arrange) with other teachers to present their stories to younger classes in the school.
2. To help students understand allegory, have them read and discuss other environmental allegories (for example, The Lorax and the Butter Battle Book by Dr. Seuss).

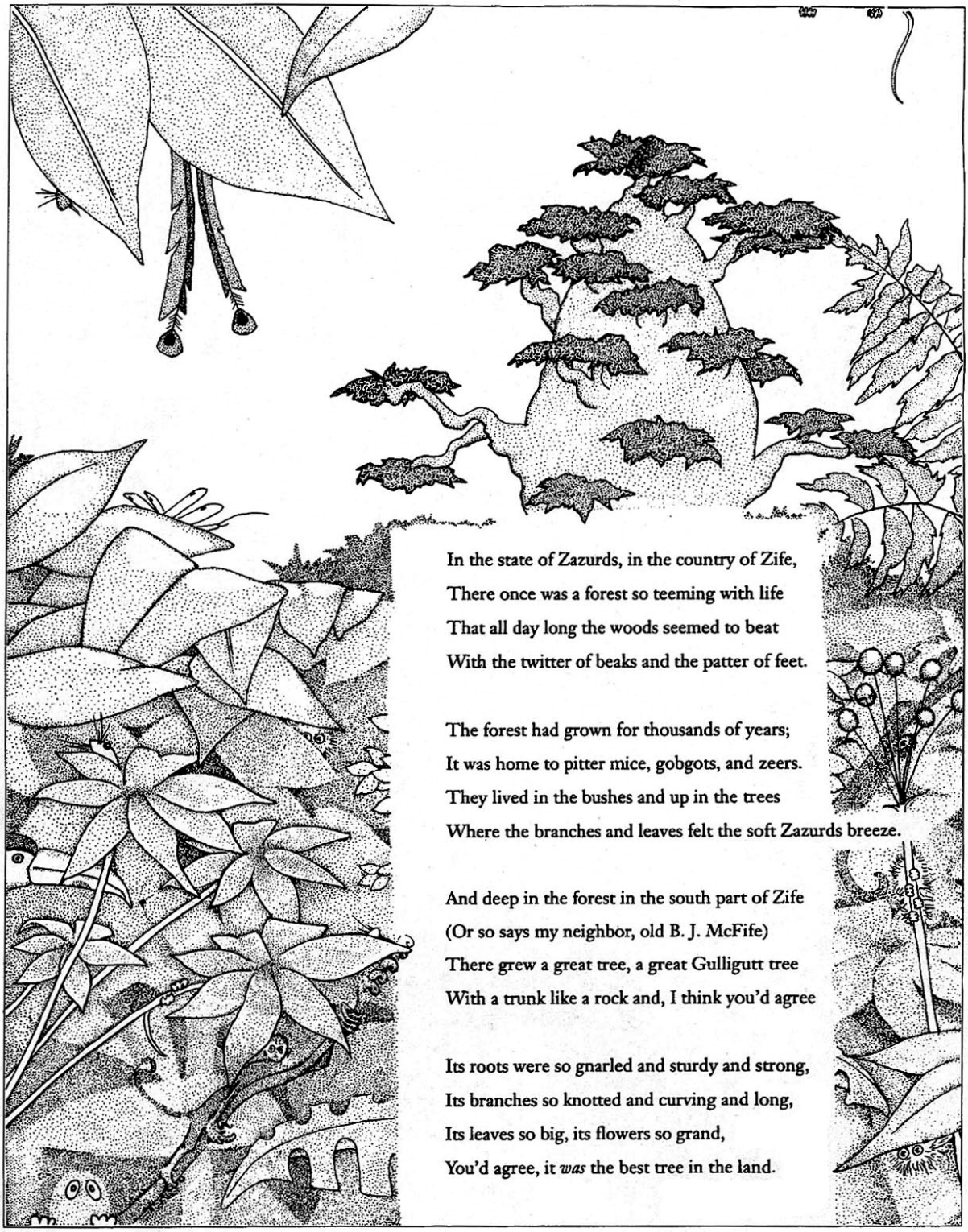
Procedure

1. Read the Birds of Zazurds and discuss the story to process student understanding of the allegory, and to analyze the waste management issues presented. Discuss how the problems evolved, what attitudes were responsible for the problems that developed, and how the problems were addressed. Analyze the characters, discuss how realistic they were, and how they could represent people.
2. List additional waste management issues students are familiar with that were not mentioned in the story. Imagine how these issues might be described in a Zazurdian (allegorical) setting.
3. Discuss imaginary scenarios that could take characters or situations into the future, or before the time of the story. It may be helpful to start by taking an imaginary trip with B.J. McFife back to Zife. Students might imagine either a land where problems continue to be dealt with successfully, or where characters create new waste problems. Behaviors of any of the other animals mentioned in the story could be developed and those animals could interact with the Birds. Consider the same story from the Gobgot's point-of-view, or as it might be told by B.J. McFife.
4. Have students write their sequels in prose or verse. Work individually, in pairs, or in small groups. develop illustrations to accompany the story.
5. Edit and revise the works.
6. Read and discuss the sequels in class to further develop students' understanding of the issues and ideas for solving waste problems.

Follow-up

1. After the writing has been edited and discussed in class, students can read both the Birds of Zazurds and the sequel to younger classes, and lead discussion following the stories.
2. Discuss student understanding of the waste management issues after having presented to other groups.
3. Brainstorm action steps the students might take to avoid developing problems with waste in school, at home, and in the community.

PATHWAYS TO A SUSTAINABLE FUTURE



In the state of Zazurds, in the country of Zife,
There once was a forest so teeming with life
That all day long the woods seemed to beat
With the twitter of beaks and the patter of feet.

The forest had grown for thousands of years;
It was home to pitter mice, gobgots, and zeers.
They lived in the bushes and up in the trees
Where the branches and leaves felt the soft Zazurds breeze.

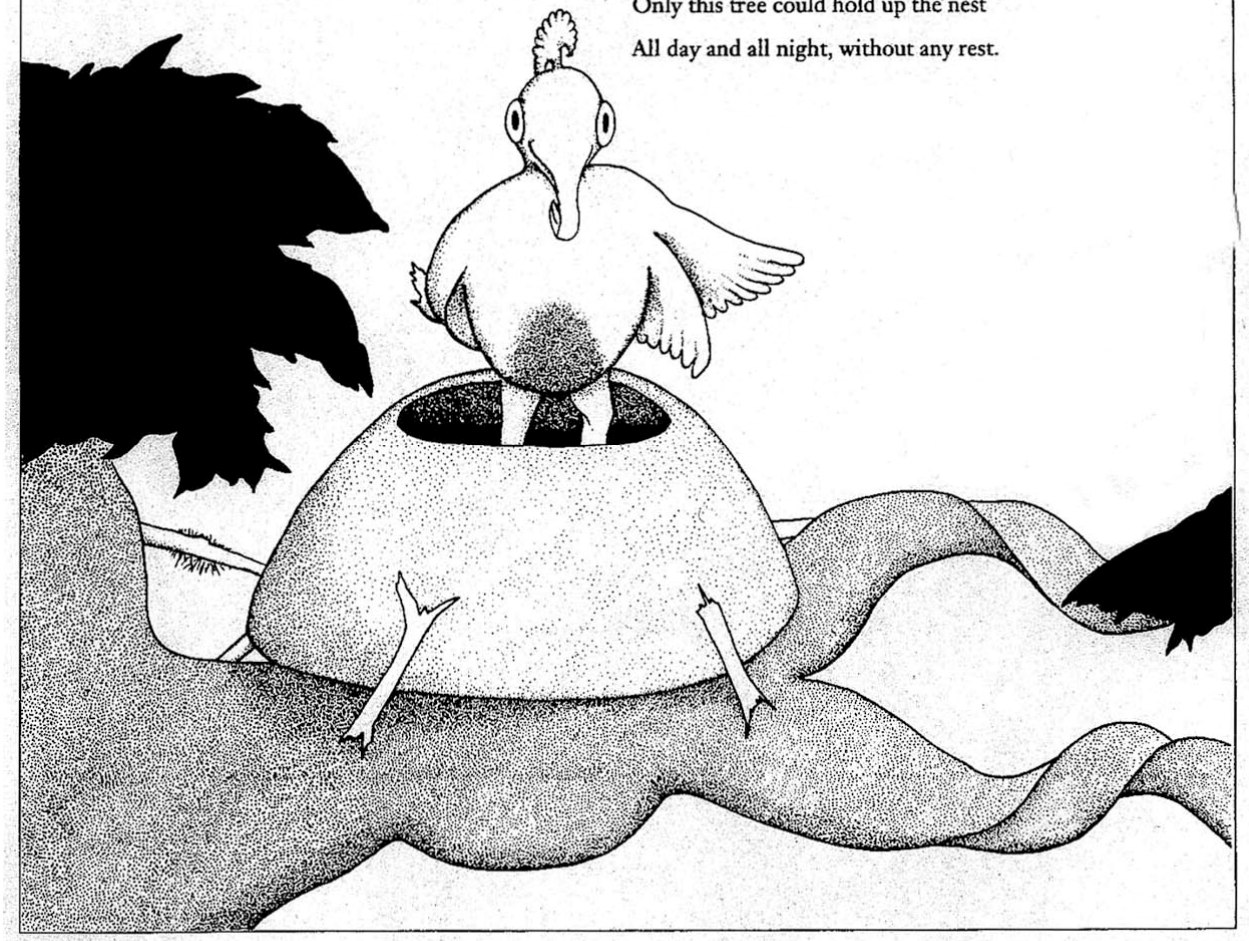
And deep in the forest in the south part of Zife
(Or so says my neighbor, old B. J. McFife)
There grew a great tree, a great Gulligutt tree
With a trunk like a rock and, I think you'd agree

Its roots were so gnarled and sturdy and strong,
Its branches so knotted and curving and long,
Its leaves so big, its flowers so grand,
You'd agree, it *was* the best tree in the land.

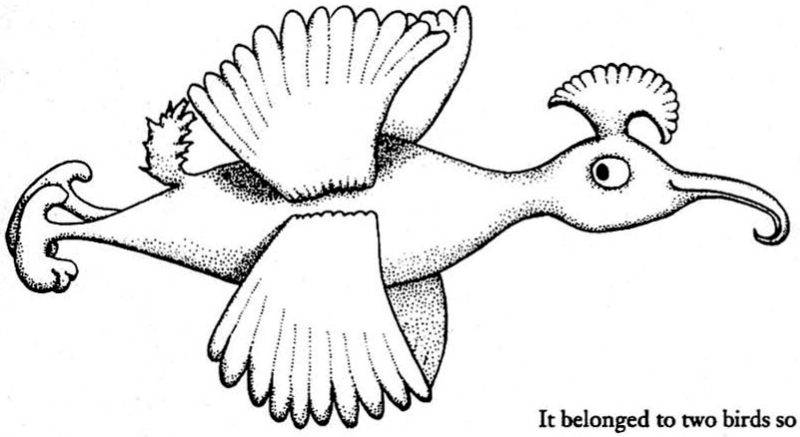
And way up high in the tip-tippy-top
Of that Gulligutt tree, something was propped.
It was a nest! Like no other nest
One hundred miles east or one hundred miles west!

The nest was quite simple, made of twigs and dry mud;
It kept out the rain in the heaviest flood;
It was soft on the inside and tough on the out;
The top was quite skinny, the bottom quite stout.

And the nest was so big, so heavy and bold,
That only this tree, or so I've been told,
Only this tree could hold up the nest
All day and all night, without any rest.



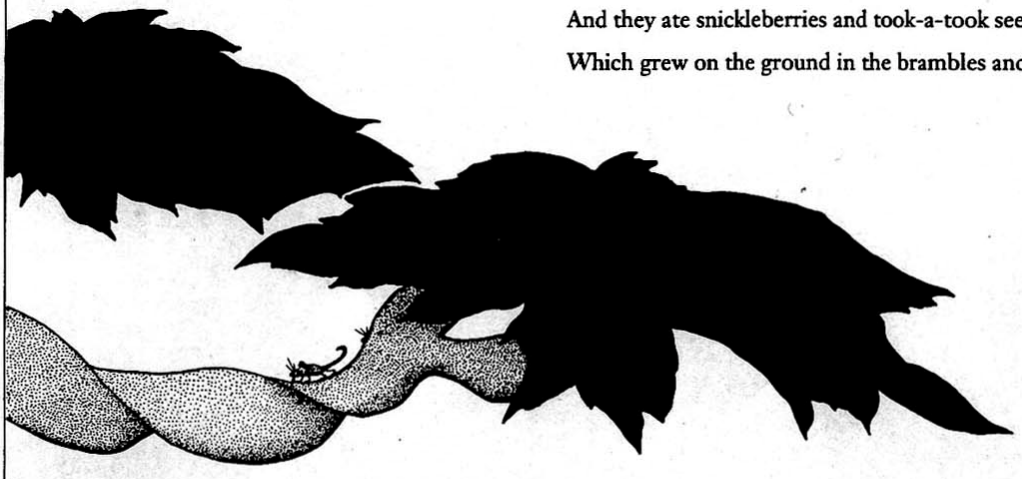
PATHWAYS TO A
SUSTAINABLE FUTURE

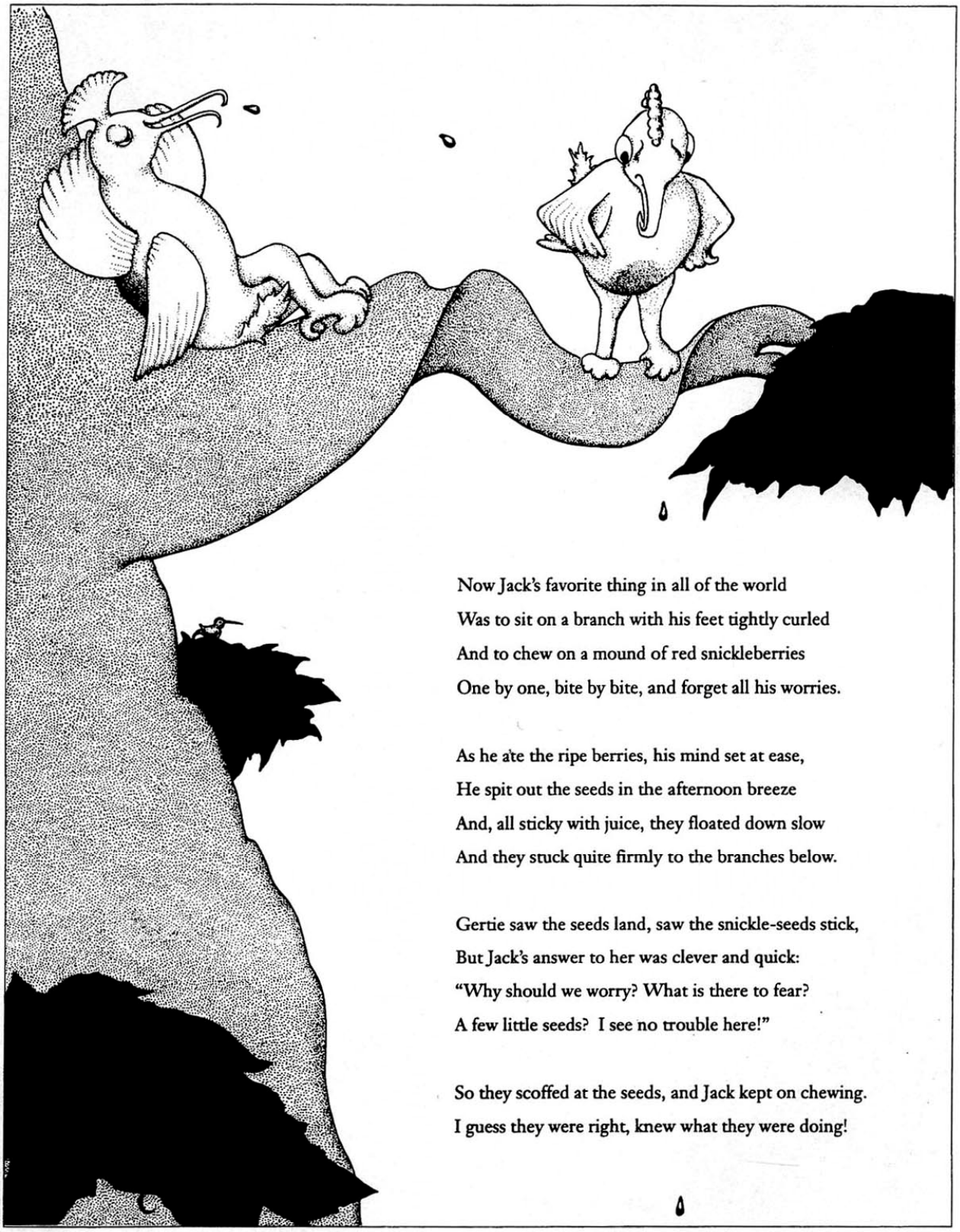


It belonged to two birds so rare in that land
You could count on the fingers of only one hand
And still count them all, in the whole land of Zife,
In the whole living world (or so says McFife).
And though it sounds odd, though it's downright absurd,
They were called the Zazurds Backwards Flutter Birds!

They flew on four wings with their tails going first,
Their heads going last, and their feet in reverse.
And that might be a hint why just two of these birds
Lived in that Gulligutt tree in Zazurds.

One's name was Gertrude and one's name was Jack
She had red on her belly, he had red on his back.
And they ate snickleberries and took-a-took seeds
Which grew on the ground in the brambles and weeds.





Now Jack's favorite thing in all of the world
Was to sit on a branch with his feet tightly curled
And to chew on a mound of red snickleberries
One by one, bite by bite, and forget all his worries.

As he ate the ripe berries, his mind set at ease,
He spit out the seeds in the afternoon breeze
And, all sticky with juice, they floated down slow
And they stuck quite firmly to the branches below.

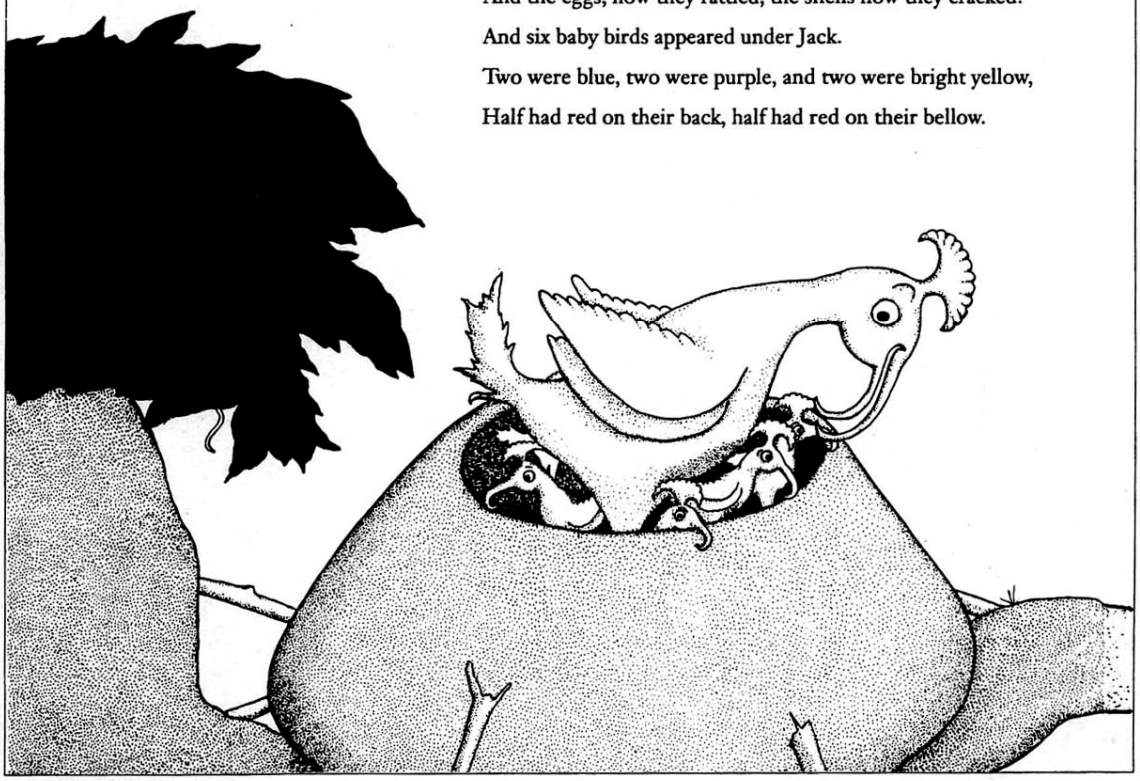
Gertie saw the seeds land, saw the snickle-seeds stick,
But Jack's answer to her was clever and quick:
"Why should we worry? What is there to fear?
A few little seeds? I see no trouble here!"

So they scoffed at the seeds, and Jack kept on chewing.
I guess they were right, knew what they were doing!

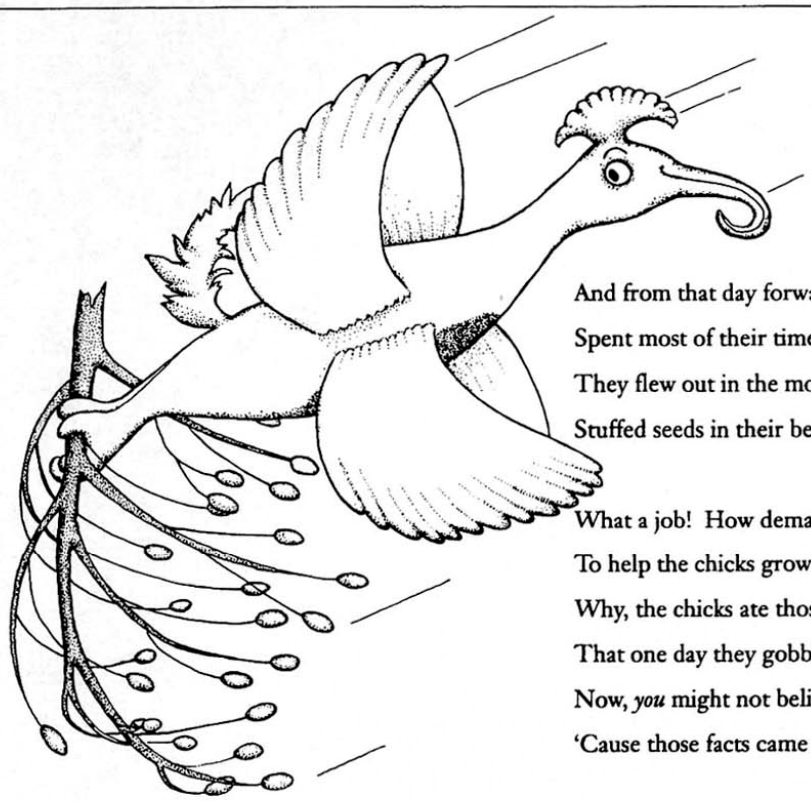
Now one day as Gertrude perched in the tree
She suddenly felt a twitch in her knee.
The twitching and itching grew, and it grew
Her face turned yellow and purple and blue
And she started to think she was losing her legs
When in fact, she was... yes!... she was laying some eggs!

The first two were yellow, all shiny and new.
The next two were purple, the last two were blue.
And Jack, with a smile, nestled down in the nest
And all winter and spring, warmed the eggs with his chest.

Finally, one morning, the 13th of May,
Gertrude said, "Honey, today is the day!"
And the eggs, how they rattled, the shells how they cracked!
And six baby birds appeared under Jack.
Two were blue, two were purple, and two were bright yellow,
Half had red on their back, half had red on their bellow.



PATHWAYS TO A
SUSTAINABLE FUTURE



And from that day forward, young Gertrude and Jack
Spent most of their time flapping forward and back,
They flew out in the morning, gathered up food,
Stuffed seeds in their beaks, and returned to their brood.

What a job! How demanding! It took all day long
To help the chicks grow to be healthy and strong.
Why, the chicks ate those berries at such a fast rate
That one day they gobbled six hundred and eight!
Now, *you* might not believe that, but I'd bet on my life,
'Cause those facts came straight from old B. J. McFife!

And B. J. says it's true that those Birds of Zazurds
Would not stop at seconds or even at thirds,
They would always eat fourths and usually fifths
And one bird, once, had seventy-sixths!

So Gertrude one day developed a plan
To speed up the process of feeding her clan.
She stopped stuffing berries inside of her cheeks
And instead plucked whole branches off trees with her beak.

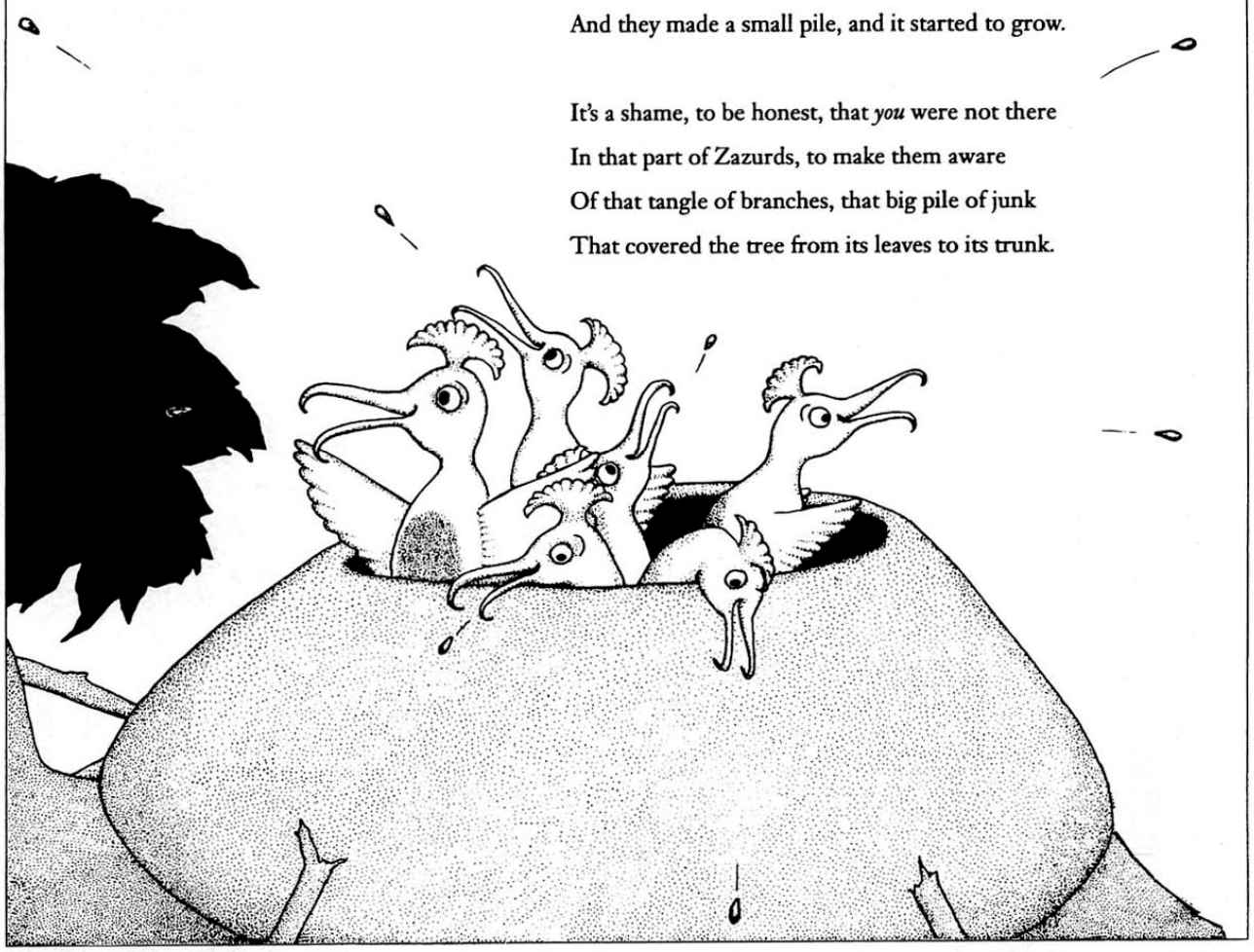
Then she could fly with the branch in her feet,
The limbs trailing ahead, as she flew in retreat.
Sometimes the branches would hold fifty berries!
Enough to feed all of her chicks in one carry.

And though this was handy, though it saved lots of time,
I'll bet there's a question that weighs on your mind:
"What did they do with the branches and seeds
Left at the end of their whole-family feeds?"

Well, the little birds did what their Daddy would do:
They spit out the seeds with a loud, "Puh-puh-TOO!"
And they threw all the branches right out of the nest,
Without really knowing where they all came to rest.

But I'll bet *you* know! You know where they landed!
They got caught in the Gulligutt tree, and were stranded.
They stuck to the limbs of the tree down below,
And they made a small pile, and it started to grow.

It's a shame, to be honest, that *you* were not there
In that part of Zazurds, to make them aware
Of that tangle of branches, that big pile of junk
That covered the tree from its leaves to its trunk.



Then you could have said, "What a terrible mess!"
And demanded they clean it, though I must confess
I'm not sure those messy old Birds of Zazurds
Would have paid much attention to anyone's words.

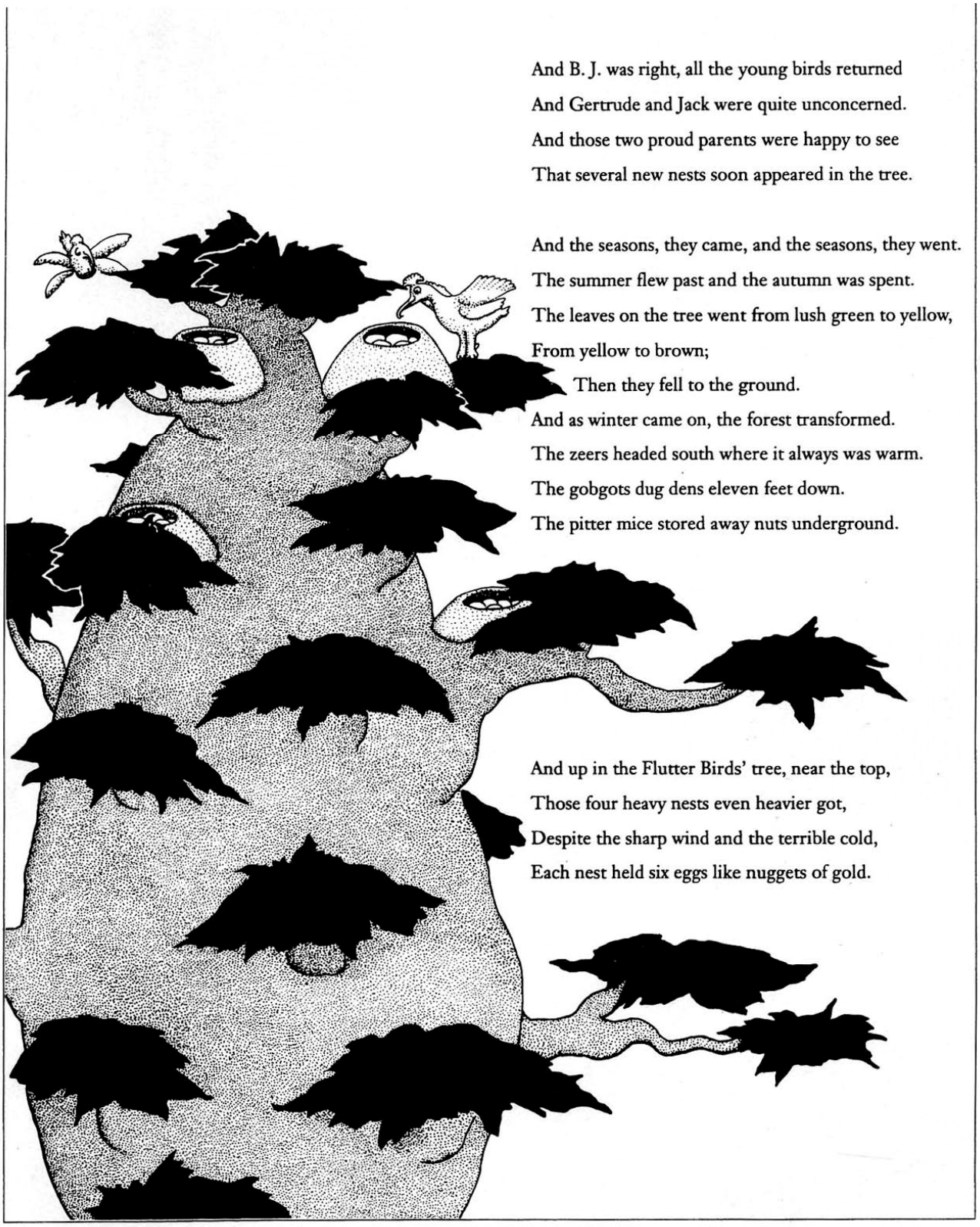
They would surely have smiled and thanked you profusely
And said to themselves as they brushed you off loosely,
"Why should we worry? What is there to fear?
A few little sticks? We see no trouble here!"

So Gertrude and Jack brought more branches back.
It saved lots of time, which let them relax.

BREAK FOR DISCUSSION (optional)

Well, those young Flutter Birds were not young for long.
Their bodies grew solid, their feathers grew strong.
And soon, one by one, they leaped from the nest,
Thrust forward their feet, and puffed up their chests,
They flapped all four wings and let out a cry
And fluttered away in the blue Zazurds sky.

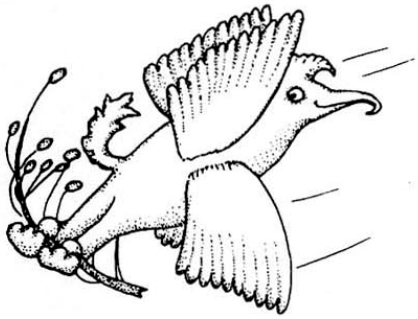
So I asked McFife if Gertie and Jack
Were afraid that their children might never come ba
But B. J. said, "No! Not afraid in the least!
Did you forget? From Southwest to Northeast,
No other tree in the world could support
The weight of a nest of the Flutter Birds' sort.
So those young Flutter birds would as surely be back
As their mother was Gertrude, as their father was Jack."

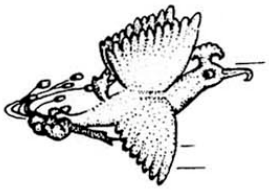


And B. J. was right, all the young birds returned
And Gertrude and Jack were quite unconcerned.
And those two proud parents were happy to see
That several new nests soon appeared in the tree.

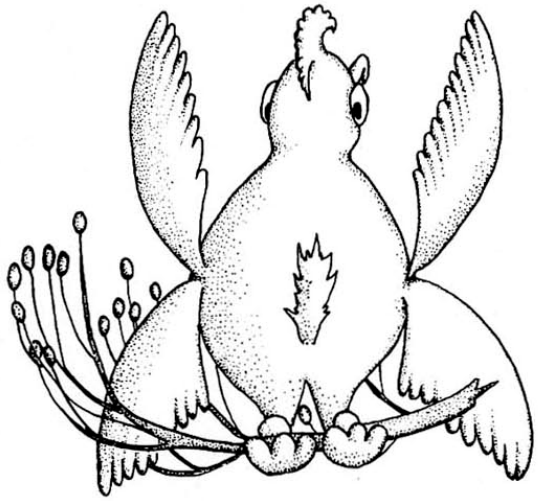
And the seasons, they came, and the seasons, they went.
The summer flew past and the autumn was spent.
The leaves on the tree went from lush green to yellow,
From yellow to brown;
Then they fell to the ground.
And as winter came on, the forest transformed.
The zeers headed south where it always was warm.
The gobgots dug dens eleven feet down.
The pitter mice stored away nuts underground.

And up in the Flutter Birds' tree, near the top,
Those four heavy nests even heavier got,
Despite the sharp wind and the terrible cold,
Each nest held six eggs like nuggets of gold.



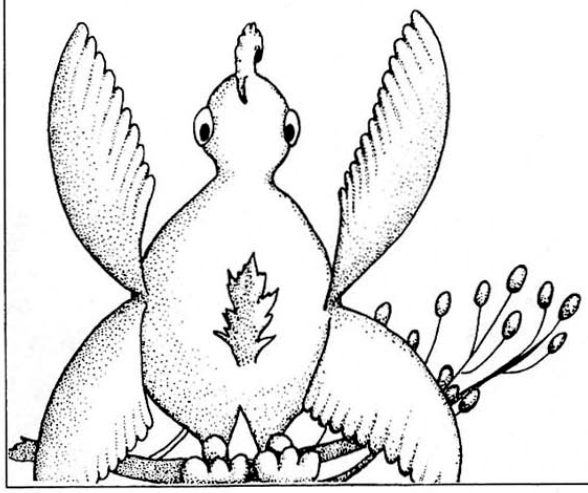


And when springtime returned and brought back the zeers,
When the gobgots woke up and the mice reappeared,
Those Flutter Birds' eggs all trembled, all cracked,
And made proud grandparents of Gertrude and Jack.



Then the forest was filled with melodious peeps
With melifluous chirps and harmonious cheeps
You could hear that marvelous noise throughout Zife,
Or so says my neighbor, old B. J. McFife.

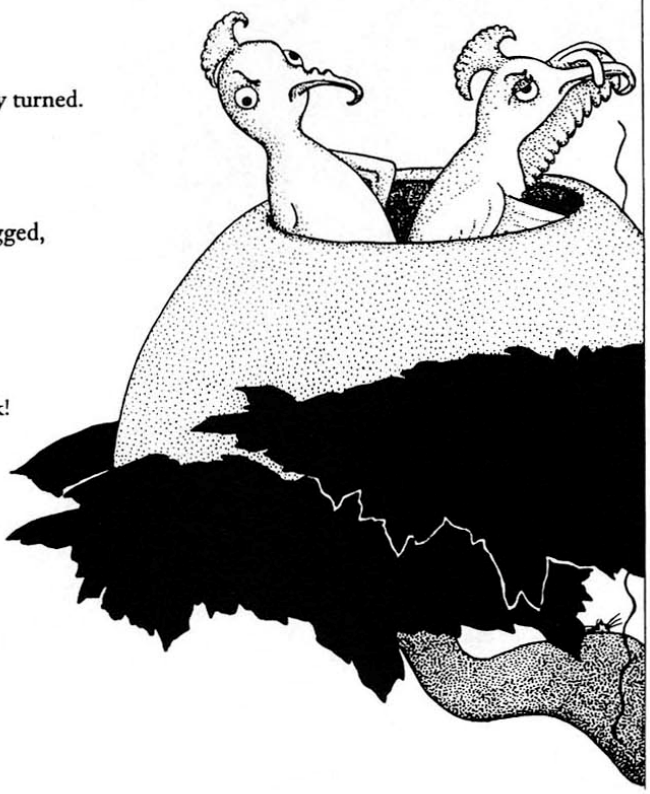
And now all the mommies and now all the daddies
Flew out to find took-a-took seeds for their laddies
They carried back branches, they carried back sticks
Which were bursting with berries and heavy, like bricks!



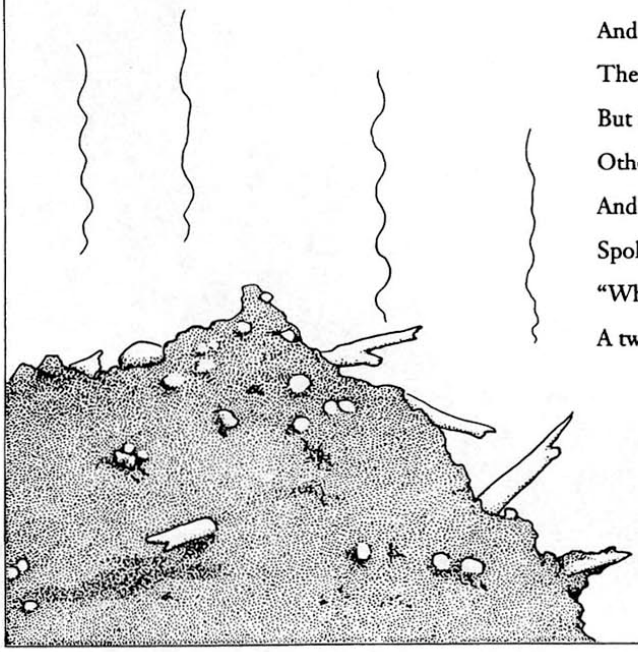
And when the birds finished with chewing their food,
They spit out the seeds —which *I* think is quite rude—
And they threw down the stems without thinking at all.
Now, the pile beneath them was no longer small.

And sometime that summer, the new generation
All learned how to fly, all flew off in formation
And nobody worried, they all soon returned,
And they all built their nests, and the seasons, they turned.

Fall brought the colors and winter brought eggs,
Spring brought new chicks who hungered and begged,
And summer brought plenty of berries and play
And though I hate to admit, I really should say...
That terrible, horrible thicket of junk,
Well, it grew, and it grew, and it grew, and it stunk!



And that's how it went, just exactly like that,
The year after that, and the year after that!
The birds built their nests, the junk pile got fat,
The year after that, and the year after that.



And each year there were birds who would look at the pile,
They would look at the seeds, now rotten and vile,
But before they could shout, "This pile's a disaster!"
Other parts of their brain would work slightly faster
And remember the words from many years back
Spoken by great-great-great- grandfather Jack:
"Why should we worry? What is there to fear?
A twenty-foot pile? I see no trouble here."

PATHWAYS TO A
SUSTAINABLE FUTURE

But....
I guess they were wrong! They didn't know squat!
What they did to that tree was not right. It was not!

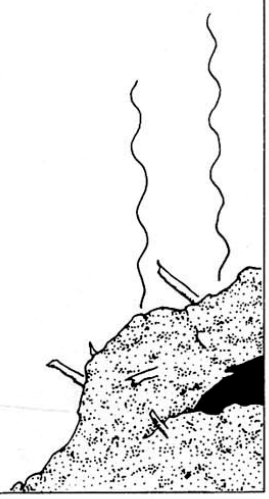
And I wonder what ancestors Gertrude and Jack
Would have said if they'd heard the terrible CRACK!
Would have said if they'd seen the tree leaning back
Would have said if they'd seen all those branches go slack.

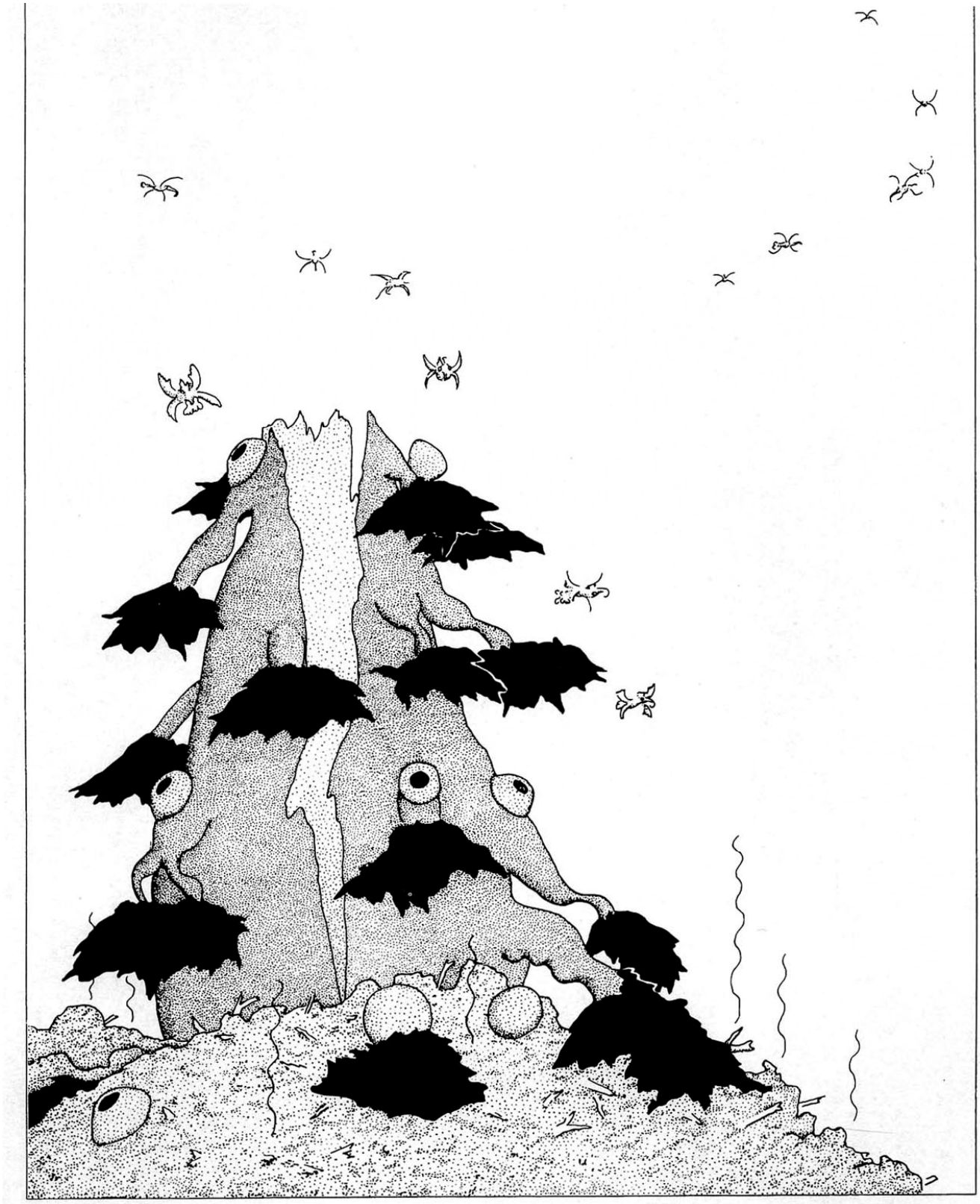
It just was too much! Too much weight weighing down!
It's a wonder that tree didn't fall to the ground!
But fall it did not! It stood right in its place
Now, without the same strength and without the same grace.

But that crack was a warning to those Birds of Zazurds
A warning that 20 foot piles are absurd!
And they'd better get working to clean up their mess
Before worse things occurred and the problem progressed.

So they did get to work, they heeded the warning,
They made up their plans that very same morning.
They all stopped their playing, stopped flying, stopped eating,
They flocked to the tree and they held a great meeting.

BREAK FOR DISCUSSION OF POSSIBLE SOLUTIONS




PATHWAYS TO A
SUSTAINABLE FUTURE

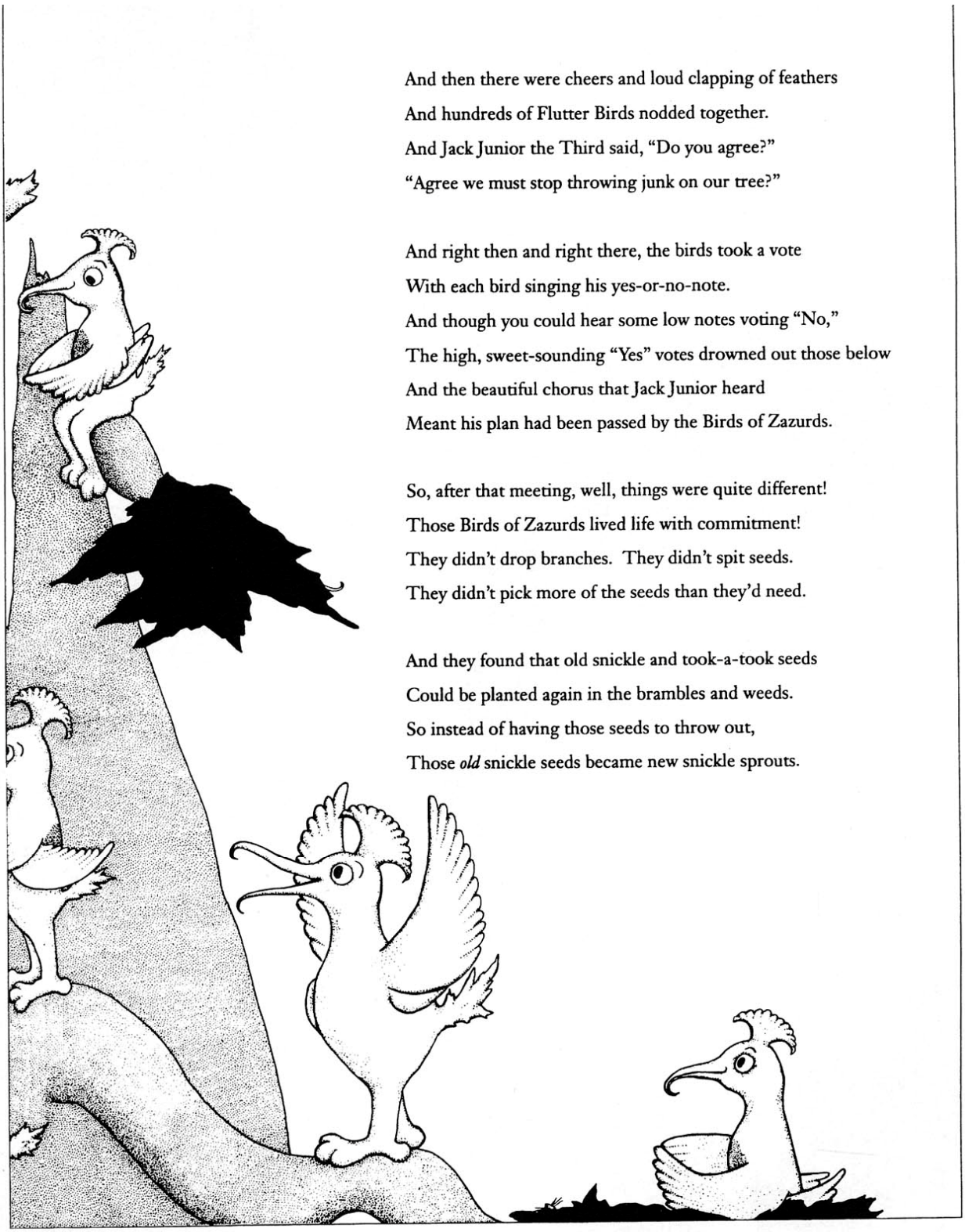
Now the first plan was brilliant, it came from a bird
Named Jack Junior Jack Junior Jack Junior the Third
And Jack was descended completely directly
(You've probably already guessed it correctly)
From the very first Gertrude and very first Jack
Who settled that tree oh so many years back.

And Jack Junior the Third spoke to all of the birds
And he spoke very loud so his words could be heard.
He said, "Friends, the first thing I'll tell you today
Is that we must change how we throw things away!"

"Spitting out seeds is a thing of the past!
Throwing out branches must end now, at last!
For all of this time it has seemed to be free
To throw all our junk on our Gulligutt tree."

"But free it is not! It has a huge cost
Our very own Gulligutt tree may be lost!
And in some parts of Zife, the forest is bare
And took-a-took plants have become downright rare."

"So I say to you all, my family and friends,
This is the plan that I now recommend:
Don't pluck off a *whole* branch of took-a-took seeds,
Only take a small twig with the seeds that you'll need.
And the leftover branch? Clamp your beak right around it
And return it right back to the place that you found it!
Then the thicket of junk that lurks down below
Won't expand, won't increase, won't enlarge, and won't grow."



And then there were cheers and loud clapping of feathers
And hundreds of Flutter Birds nodded together.
And Jack Junior the Third said, "Do you agree?"
"Agree we must stop throwing junk on our tree?"

And right then and right there, the birds took a vote
With each bird singing his yes-or-no-note.
And though you could hear some low notes voting "No,"
The high, sweet-sounding "Yes" votes drowned out those below
And the beautiful chorus that Jack Junior heard
Meant his plan had been passed by the Birds of Zazurds.

So, after that meeting, well, things were quite different!
Those Birds of Zazurds lived life with commitment!
They didn't drop branches. They didn't spit seeds.
They didn't pick more of the seeds than they'd need.

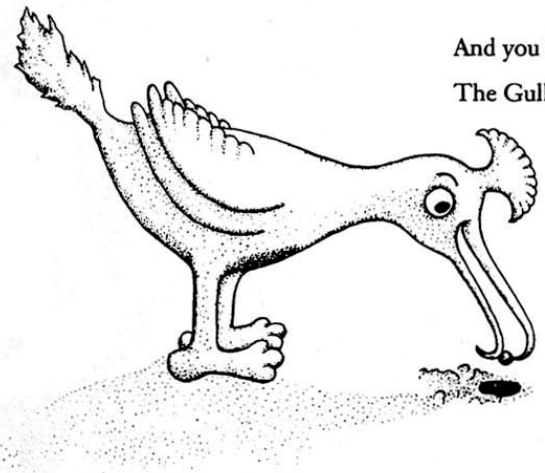
And they found that old snickle and took-a-took seeds
Could be planted again in the brambles and weeds.
So instead of having those seeds to throw out,
Those *old* snickle seeds became new snickle sprouts.

And the Birds of Zazurds planted every last seed
That once had been stuck to their Gulligutt tree
So that snickle and took-a-took plants did abound
And they covered the forest for miles around.

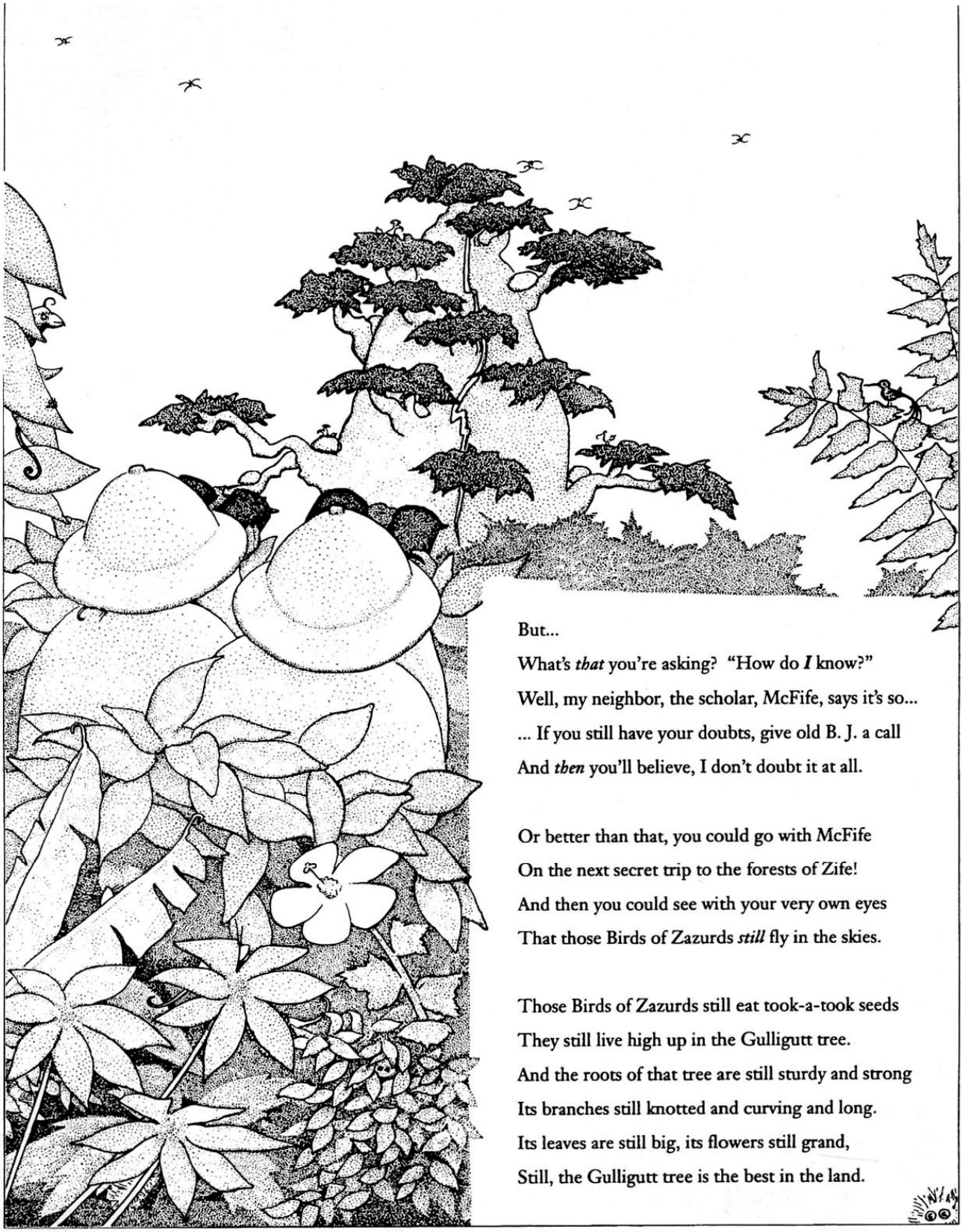
And it took a long time; it took several years
But soon all the Gulligutt branches were clear!
And then, after that....Well, would you believe?
The Gulligutt tree heaved a sigh of relief
And the Birds of Zazurds, well, they started to sing,
For they knew they had done the exactly right thing!

Then the birds sang quite often, they sang sweet and loud
They sang mostly because they were happy and proud.
By working together, by having a plan,
They had rescued their tree, they had rescued their clan!

And one day when Flutter bird Gertrude FlipFlupper
Was planting some seeds leftover from supper,
She fluffed up her feathers and threw back her head
And with pride in her voice, she truthfully said:
"No reason to worry! No reason to fear!
The pile is gone! There is no trouble here!"



And you know, she was right! There was nothing to fear.
The Gulligutt tree was out in the clear.



But...
What's *that* you're asking? "How do *I* know?"
Well, my neighbor, the scholar, McFife, says it's so...
... If you still have your doubts, give old B. J. a call
And *then* you'll believe, I don't doubt it at all.

Or better than that, you could go with McFife
On the next secret trip to the forests of Zife!
And then you could see with your very own eyes
That those Birds of Zazurds *still* fly in the skies.

Those Birds of Zazurds still eat took-a-took seeds
They still live high up in the Gulligutt tree.
And the roots of that tree are still sturdy and strong
Its branches still knotted and curving and long.
Its leaves are still big, its flowers still grand,
Still, the Gulligutt tree is the best in the land.

The Life Cycle of Glass

(Adapted from: Wrap Sessions: town of Islip Recycling Curriculum, Department of Environmental Control, Islip, NY, and Rethinking Recycling: An Oregon Waste Reduction Curriculum, Oregon Department of Environmental Quality)

Teacher Worksheet

Background

Glass is an old material. It is made by adding the ingredients in large containers and then heating to about 2,800 degrees Fahrenheit. At that point it can be shaped and allowed to cool. The earliest glass jar on record was made about 3000 BC. Glass is also very durable. There is no estimate when glass will decompose. (At least 1,000,000 years). Glass is easily recyclable and many savings are derived from the recycling. Most glass, even deposit bottles, are simply ground up and put to new uses.

The Information sheet for this activity provides the students with facts they can use to answer the questions on the student worksheet. (It is included on the disk as part of the student worksheet.)

Materials

- Each student needs an Information Sheet and Student Worksheet
- Graph paper for each student

Procedure

- Hand out the Information Sheet and go over it briefly with students. Then give out the Student Worksheet and assist them with the questions.

Vocabulary

Soda ash: (also known as washing soda and sodium carbonate) occurs as a crystal both naturally and can be manufactured.

Limestone: A hard sedimentary rock.

Feldspar: Abundant group of rock-forming minerals that make up as much as 60% of the Earth's crust occur as colorless or pale-colored crystals.

Kilowatt-hour: A measure of electrical energy equivalent to a power consumption of 1,000 watts for one hour.

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in daily life
Science	5	Students will describe resource-related activities in which they could participate to benefit their communities.
Mathematics	5	Students select and use appropriate algorithms for computing with fractions, decimals, and percents in problem solving.
History	1.2	Students create time lines that show events in sequence

The Life Cycle of Glass

1. Get a piece of graph paper and make a time line showing the dates and events on the information sheet.

2. About when was glass first used in home construction? _____

3. How much later after windows were mirrors invented? _____

4. How long have people been using glass? _____

5. How many pounds of sand, soda ash, limestone, and feldspar does it take to make 5 tons of glass?

6. How many KWH (Kilowatt-Hours) of energy are needed to make a ton of recycled glass?

7. How much water will be needed to make 4 tons of recycled glass? How much will be saved?

8. How many gallons of oil are saved by recycling 43 tons of glass?

9. If you recycled all 400 of your bottles, how long would a 100-watt bulb burn with the energy you saved?

10. If a community recycles 8 tons of glass, how much sand will be saved and how much energy?

11. If a new bottle can be made of 50% recycled glass, how much sand, Soda Ash, Limestone, and Feldspar will be saved making a ton of new glass?

The Life Cycle of Glass
Information Sheet

The First Jar Made of Glass	3000 BC
An all Glass Ancient Container	1500 BC
A Blowpipe To Shape Glass Is Used	30 BC
The First Glass Window	50 AD
The First Glass Window In the Western Hemisphere	1535 AD
First Mirror	1685 AD
First Glass Eyeglasses	1790 AD
Fiber For Telephone Cables	1980 AD

The Recipe For 1 Ton Of Glass (Resources)	**Savings From Recycling 1 Ton of Glass**
1300 Pounds Sand 400 Pound Soda Ash 400 Pounds Limestone 150 Pounds Feldspar 24000 Gallons Water 4400 KWH of Energy	Requires 32% less energy Requires 50% less water Creates 20% less air pollution Saves 10 Gallons of Oil Saves 1.2 tons of raw materials

By recycling one bottle you save enough energy to run a 100-watt light bulb for 4 hours
Glass containers make up about 3% of all landfills
Bottles can be made up of up to 50% recycled glass
Each person in the U.S. uses about 400 bottles and jars each year

Plastic Recycling

Teacher Worksheet

Background

Plastics are made up of building blocks called hydrocarbons, which are derived from petroleum or natural gas. Plastics are considered a nonrenewable resource because the conditions under which petroleum and gas were formed no longer exist. Production of plastics creates a lot of pollution. Thus, recycling whatever plastics we can slows the consumption of natural resources and protects the environment.

There are several different types of plastics, all with their own scientific properties. Because of differences in their properties, they cannot all be melted together to make new plastic. They must be sorted by type and then each type is melted and formed back in to pellets. The pellets can then be used in the production of new plastic materials. The technology in this field is changing rapidly. Some areas of the country are able to profitably collect and recycle all seven types of plastics, while others focus upon only one or two types. It will help your lesson if you contact local recyclers to find what the protocol is in your area. This lesson is directed at all seven types of plastic, even though all may not be recyclable in your area.

Procedure

1. Have students do a home inventory the night before the first lesson. Ask them to find 2-5 plastic items at home that are marked with the plastics coding system. Have them record the name of the item and the code number on a sheet of paper.

2. Hand out the Plastics Coding System sheet that lists the numbers, names, uses, and recycling uses of each plastic type. Students can put the name or abbreviation by the plastic items they found in their inventory. A positive activity is to have them record which items they listed are recyclable in their community.

   (Note) Students will have had no problem locating plastics numbered 1, 2, and 5. These are commonly used for food packaging. Polystyrene, #6, is being used less and less because of limited recycling applications and air quality concerns. It still can be found in egg cartons and Styrofoam cups. Polyvinyl chloride (#3) has very few food applications because of concern over carcinogenic effects. However, most plastic piping is PVC, as well as many cleaning fluid bottles such as window cleaners. Not many low-density polyethylene (#4) applications are very well labeled, but almost all plastic wraps and sandwich bags are low-density polyethylene. Plastics marked #7 are special layered or mixed plastics for special purposes. These can often be recycled if kept separate from other plastics

3. Identifying properties of plastics is the second part of the activity. It is best done in groups. Prepare for this by cutting out a set of 1" samples of the 6 types of plastics for

each group. (Skip #7, as they are mixtures and their composition can vary). Clearly number each sample and put the sets in envelopes.

Suggested Sources

1. (PETE) Soda or water bottles
2. (HDPE) Milk jugs
3. (PVC) Pipe from a hardware store - easily cut
4. (LDPE) Cling wrap or sandwich bags
5. (PP) Margarine tubs or screw-on lids
6. (PS) Plastic egg carton

* For some added interest use more than one source for each type of plastic

The second part of the preparation is to prepare some solutions for testing densities of the plastic. Solutions will have high, medium high, medium low, and low density. By testing their plastic sample in each solution, the students will be able to estimate the density of the plastic.

- If the plastic floats in all solutions, it has low density.
- If it sinks in all solutions it has high density.
- If it floats in some and sinks in others, it has medium, medium high, or medium low density.

To test the plastic, the student simply drops the sample in a solution and holds it under the surface with a toothpick to break the surface tension. The student then observes if the plastic sinks or rises back to the surface

Preparing the Solutions*

1. **High density**: Add 25 grams Epsom Salt for every 75 ml water - dissolve
2. **Med. high density:** Add 10 grams Salt to every 90 ml water - dissolve
3. **Med. low density**: Use plain water
4. **Low density**: Mix 1 to 1 ratio isopropyl alcohol and water.

* Materials for the solutions are inexpensive and easily obtainable from a local drug store or supermarket. Mix enough so that each group can have a set of solutions in 4 small paper cups. Because the alcohol solution may irritate hands, we recommend protective gloves in case their hands get wet despite using the toothpick, and to instruct students not to touch their face or eyes with the gloves.

4. Distribute to students the Plastic Properties Worksheet and explain the tests they will perform. The second page of the worksheet also explains these tests. Each group should test each plastic sample and record their individual observations.

   Test 1 Clear or Opaque
   Can you see clearly through it?
   Test 2 Rigid, Semi-rigid or Flexible
   Is it easy or hard to bend? Or does it bend at all?
   Test 3 Density

Does it have high density, medium-high, medium, medium-low, or low density? Determine this by dropping the sample into the four solutions and observing.

Test 4 - Foamy, crinkly, glossy, other
Noticeable qualities about the sample

5. For advanced students or extra credit, an additional exercise follows to identify an unknown plastic using these same solutions, so can be done the same day or the day following. This follow-on exercise has its own "Unknown Plastic" teacher and student worksheets.

Materials

- Each student brings 2-5 samples to school from home.
- Plastics Coding System Handout for everyone in class
- Plastic Properties Worksheet for all class members. The second page contains instructions.
- Prepared sets of 6 plastic samples for each group - labeled and in envelope
- Protective gloves—one pair for each group
- Prepared density testing solutions and paper cups as containers for each group
- Toothpicks

Vocabulary

Opaque: Not able to see through; not transparent

Solutions: (Used as in this experiment) A liquid mixture in which the minor component (the solute) is uniformly distributed within the major component (the solvent).

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in daily life
Science	1	Students will use appropriate tools to gather and organize observations
Science	5	Student investigates and describes uses of nonrenewable resources

Plastic Recycling
Plastic Properties Worksheet

Plastic Type	Clear/Opaque	Rigid/ Semi-rigid/ Flexible	Density	Foamy /Crinkly Glossy/Other
1 PETE				
2 HDPE				
3 PVC				
4 LDPE				
5 PP				
6 PS				

Suppose a recycler had a lot of plastic of all different types in one pile. What do you think would be the best way to separate them into piles by type? _____

_____

Plastics Recycling

Properties of Plastics

Student Instruction Sheet

Test 1 - Clear or Opaque (First Column of the Worksheet)
To make this test, hold the piece of plastic about 3 or 4 inches from some writing on a book or newspaper. Attempt to determine the words on the paper while looking through the plastic.

A. If you can read the writing, classify the plastic as "clear".
B. If you cannot make out the words, classify it as "opaque"

Test 2 - Rigid, Semi-Rigid, Flexible (Second Column)
Use your thumb and first finger for this test. Put your thumb on the bottom edge and your finger on the top edge. Apply pressure to try and make the top edge fold over and touch the bottom edge.

A. If the top folds over to the bottom easily, it is "flexible".
B. If you can make the top and bottom touch, but you must push hard to do it, then the plastic sample is "Semi-rigid". Semi-rigid samples often will stay bent.
C. If you cannot make the top and bottom edges touch using your thumb and finger, then the plastic sample is "rigid". Rigid samples will often spring back to their original shape.

Test 3 - Density (Column Three)
Density is a measure of the mass per unit volume of a substance. Think of the difference between lead (lead is a metal like the shot used in BB guns or in some fishing weights or sinkers) and wood. Lead has a high density and sinks in water. Wood has a low density and floats in water. You will describe the densities of the plastics as "low", "medium low", "medium high" or "high".

Your teacher has made up some solutions with different densities to test the plastics. The solutions are fairly safe, but please wear plastic gloves and definitely avoid touching your face and eyes with the wet gloves. You will put each sample of plastic in the four different solutions. The solutions have different densities ranging from low to high.

A. Plastic samples with "high" density will sink in all four of the solutions
B. Plastic samples with "low" density will float in all the solutions
C. Plastic samples that have "medium low" density will float in most, but sink in one of the solutions.
D. Plastic samples that have "medium high density" will sink in most, but float in one solution

You are finished with your gloves when you have finished with this portion of the experiment.

Test 4 - Other Properties (Column 4)
Sometimes you can just recognize a sample because it looks different from the others. For example, it might have a special color, or be very glossy, or have something else about it that none of the others have. List this in the last column of your worksheet.

Plastics Coding System

Abbreviation	Scientific Name	Uses	Recycled Uses
PETE 	Polyethylene Terephthalate	Soda bottles, water containers, waterproof packaging	Fleece coats, carpet or clothing fibers, surfboards
HDPE 	High Density Polyethylene	Milk bottles, water jugs, juice bottles, detergent bottles	Plastic lumber, flower pots, trash cans
PVC 	Polyvinyl Chloride	Detergent/cleaner bottles, pipes	Handrails and house siding
LDPE 	Low Density Polyethylene	6-pack rings, bread bags, sandwich bags	Plastic trash bags, grocery sacks, agricultural film
PP 	Polypropylene	Margarine tubs, screw-on lids, straws, refrigerator containers	Car battery cases
PS 	Polystyrene	Styrofoam, egg cartons, protective packing	Pencil holders, tape dispensers
	Multi-Layer Plastics	Squeezable ketchup and syrup bottles, layered or mixed plastic	Benches, marine pilings

Unknown Plastic
(Extra Follow-On to Plastics Recycling)

Teacher Worksheet

Background

This activity should easily follow the activity on plastic recycling. In that activity, four tests were applied to identify the properties of the six types of plastics produced for commercial use. Students in this activity will be given a plastic sample and will attempt to identify it based upon the four tests. The key will be to creatively find samples of plastic the students have not yet seen. Possibilities include pill bottles, plastic flowerpots, white paint buckets, etc. This add-on lesson presents an additional challenge for motivated students.

Procedure

1. On the day following the Plastics Recycling activity, give each student a single sample of plastic that you have prepared. You should know its type, but do not share the information with the student.

2. Hand each student a copy of the Unknown Plastic Worksheet and Plastics Coding System and instruct them to record information as they determine the identity of the plastic. The structure is intentionally open to encourage students to plan their own experiment

3. Students will be asked to conclude the identity of the unknown piece of plastic. They will need the results from the previous activity to assist them.

4. It is suggested they be given part credit for observations, even if their conclusion is incorrect. Reward the process along with the conclusion.

Answers

The most powerful test for distinguishing plastics should turn out to be the density test. Plastics behave differently in terms of floating or sinking in the solutions. The other tests for rigidity. clarity, and other properties will help when two plastics show the same density behaviors.

1. Polyethylene Terephthalate (PETE)	Is very dense and should sink in all four solutions
2. High Density Polyethylene (HDPE)	Should sink in the alcohol solution but float in all the others
3. Polyvinyl Chloride (PVC)	Should sink in the alcohol and water solutions but float in the salt and magnesium

	sulfate solutions.
4. Low Density Polyethylene (LDPE)	Will sink in the alcohol solution but float in all the others
5. Polypropylene (PP)	Has low density and will float in all of the solutions
6. Polystyrene (PS)	Will float in salt and Magnesium sulfate solutions, but sink in water and alcohol solutions.

* Note that #2 and #4 as well as #3 and #6 show the same density properties. Their other properties should be enough to distinguish them from one another

Materials

- Teacher will need to prepare small samples of various plastics. One good method is to put samples in envelopes and key them by letters of the alphabet. Each student selects and tests his or her own sample.

Suggested Unknown Samples

1. A clear soda pop or water bottle
2. A frosted milk bottle or water jug
3. Cleaning solution bottle
4. Sandwich bags
5. Margarine tub
6. Plastic egg carton or Styrofoam cup

- Students will need the same materials they used in Plastics Recycling, particularly the density solutions.

- Provide one Unknown Plastics Worksheet to each student

Colorado Educational Standards Supported

Science	1	Students gather and organize data
Science	1	Students interpret and evaluate data to form conclusions
Science	1	Students will create a written plan for an investigation

Unknown Plastic

Student Worksheet

Your teacher has given you a piece of plastic that is one of the six types you learned about in the previous activity. You have been asked to identify it.

Describe what you plan to do. (Number your steps.)

Record Your Observations

Tell which type of plastic you think you have and tell why you came to this conclusion.
(Use your answers to the Recycling Plastics Activity to help you)

Track Your Waste

(Adapted from: Rethinking Recycling: an Oregon Waste Recycling Curriculum, *Oregon Department of Environment al Quality)*

Teacher Worksheet

Background

Before students can begin to understand the need for waste reduction and recycling, it is first necessary to understand the magnitude of the waste problem. The impact of a home waste audit is one of the most personal for students. It allows students to calculate a per person average for garbage generation and recycling in their homes and is a very good math exercise.

Some families do not recycle, or compost, in which case just instruct students to enter a "0" for the appropriate question. People in different communities have different access to recycling and there are many reasons why people choose not to recycle or compost.

Procedure

- Instruct students they will be weighing the trash discarded by their family for a week. The process is for the student to take out all the trash, recycling, and compost in the household. The student must weigh him/herself on a bathroom scale while holding the filled container and then reweigh holding the empty container. A subtraction will give the weight of the trash or recyclables.
- Recyclables should be separated out before trash is weighed.
- A model for the parent note explaining the activity is included in the material. It may require modification to conform to your District's practices.
- Develop in class with the students a data-tracking sheet that they can use at home and bring to school at the end of the week. If you prefer, one follows as the last page of this worksheet that can be copied and given to the students. It requires instructions for getting totals for the different materials.
- Distribute the Student Worksheet and have the students perform the calculations. They may need some help.
- It is recommended to share the information with parents at the end of the activity.

Colorado Educational Standards Supported

Geography	5.3	Student will describe the role of resources in daily life
Science	5	Students describe the resource-related activities in which they could participate to benefit their communities
Mathematics	3	Analyze based upon data obtained in surveys
Mathematics	6	Select and use appropriate algorithms for whole-number computing in problem-solving situations

Trash Data Tracking

DATE	MATERIAL (Trash, recycling, or compost)	WEIGHT With filled container	WEIGHT With emptied container	DIFFERENCE

DATE	MATERIAL (Trash, recycling, or compost)	WEIGHT With filled container	WEIGHT With emptied container	DIFFERENCE

Track Your Waste
Student Worksheet

1. Using the data you have kept, find the weight of the trash you and your family discarded last week.

2. Use the same method to calculate the weight of materials your family recycled and composted.

3. How many people are in your family?____ Use this to find the amount of trash and recycled (and composted) material per person each week for your family.

4. At the same rate, how much trash and how much recycling (and composting) would your family produce in 1 year? (1 year = 52 weeks)

5. Add your **trash + recycling (and composting)** to get the total **waste** generated by your family in one year.

6. What percent of your total waste was recycled or composted?

7. Share your answers to questions 1 and 2 with your teacher and then calculate a total for the week and for the year of trash and recycled material for your class and their families.

8. What is the average percent of waste recycled or composted for your class?

9. Each person in the United States averages about 1,500 lbs per year in total waste (trash + recycling and composting). Is your class above or below that and by how much?

10. 1,500 pounds per year corresponds to about how many pounds per day per person? Compare that to your answer about your family in question 3.

Date

Dear Parent,

Your child is currently learning about natural resources, solid waste issues, and the environment.

Part of the lesson includes helping students comprehend the amount of waste generated by the students and their households. Your child is being asked to take out all the trash and recyclables in your household during the week _____ and track their weights.

We need from you a supportive environment in which you help your child with their responsibility. It is also necessary to have a bathroom scale or other weighing device available to the student. Please contact me at _____ if this will be a problem for you and alternate arrangements need to be made.

Yours sincerely,

The Life Cycle of Aluminum

(*Lesson concept from South Carolina Department of Health and Environmental Control: Action for A Cleaner Tomorrow)*

Teacher Worksheet

Background

Aluminum makes up 8% of the Earth's crust and is the third most common element after Oxygen and Silicon. The energy saved from making an aluminum can from recycled aluminum is substantial--about 95%. Not only does recycling conserve natural resources, but also recycling takes these materials out of the waste stream, reducing the amount of trash put in our landfills.

In this activity students will explore the savings provided by recycling aluminum. The price paid for aluminum varies in Colorado. The activity assumes about $.60 per pound. The recycling contacts provided in the introduction can confirm if this is still a good assumption.

The exercise provides a fact sheet about aluminum and a series of questions follow that require arithmetic calculations. An optional exercise guides students to differentiate between different types of metal cans: aluminum, bimetal, and tin, which are actually mostly steel. This is appropriate for younger grades as well.

Materials

- Teacher will need to prepare enough student worksheets for the class.

- As an optional activity the teacher may wish to do an activity to help students recognize aluminum cans and distinguish them from other metal cans. Materials needed would be magnets and pan balances and attached sheet, "Properties of Metal Cans" as an overhead.

Procedure

1. Using the data at the top of the student worksheet, direct the students to answer the questions. The activity can be done individually or in groups.

2. (Optional) In addition to aluminum and tin cans, bi-metal cans are now used for some materials. Bimetal refers to cans with steel lids enclosing an aluminum body. Bi-metal cans are used for some tuna cans, small juice cans, tennis ball cans, and many soda cans. Tin cans are actually 99% steel with a tin coating. You may want to review properties of the three types of cans using the overhead "Properties of Metal Cans" and then set out an

array of cans for students to identify by type.

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in daily life
Mathematics	6	Students select and use proper algorithms while problem solving

Optional Metal Can Identification

Science	1	Students will use appropriate tools to gather and organize observations
Science	5	Student investigates and describes uses of nonrenewable resources

(Overhead follows on the next page for optional can identification exercise.)

Properties of Metal Cans

PROPERTIES	ALUMINUM	BIMETAL	TIN (99% Steel)
Attraction to Magnets	Not attracted to a magnet	Body is attracted to a magnet, but lids are not	Attracted to a magnet
Can Bottom	Bottom does not have a rim and has a finely brushed polished appearance	Bottom has a rim and is not finely brushed or polished	Bottom has a rim
Body of Can	Body is shiny, silver and smooth with no seams	May or may not have seams	Body has rings or ribbing and always has a seam
Can Label	Label is usually spry-painted on and usually says “all aluminum can”	Usually spray painted	Usually has a paper label
Weight	Lightest weight	Heavier weight	Heaviest weight

The Life Cycle of Aluminum

Student Worksheet

Written below is some information about the production and recycling of aluminum. Use the information to answer the questions that follow.

The Life Cycle of Aluminum
To manufacture one ton of aluminum metal, about 11,500 pounds of natural resources are used. It takes one pound of aluminum to make about 24 aluminum drink cans. Recycling companies will generally pay about $.60 per pound for aluminum. One recycled aluminum can saves enough energy to operate a television set for three hours. Recycling companies flatten and store the cans they purchase in trailers. Each trailer holds about 15,000 pounds. (7.5 tons) Aluminum manufacturing plants melt the cans and roll them into sheets for new cans. New cans are made of about 50% recycled aluminum

Questions

1. How much does the recycling company pay per can that is recycled?

2. Assume your family television set operates 6 hours per day for an entire week. How many recycled cans would provide the energy savings to operate the TV?

3. How many recycled cans does it take to fill a trailer?

4. At the rate the recycling company pays, what is the value of a trailer full of aluminum cans?

5. Since one ton is 2000 pounds, tell why you think 11,500 pounds of natural resources are needed for one ton of pure aluminum.

6. How many pounds of natural resources would be saved by recycling one trailer full of aluminum cans?

7. If a community were to recycle 1,000 pounds of aluminum cans, how many cans would that be and how many hours of television time would that equate to?

8. If there are 1,800 families in the community, how many hours of TV time did each family earn by recycling?

Ollie Saves the Planet

Teacher Worksheet

Background

Included in this curriculum is an interactive environmental education program on a CD-ROM entitled "Ollie Saves the Planet." This program has earned endorsements from the National Recycling Coalition, the Solid Waste Association of North America, and the Office of the Federal Environmental Executive, among others. The program content includes two units on solid waste (Reduce, Reuse, Recycle and Rethink), but also addresses sustainable actions for the areas of energy, water, air, and biodiversity.

The educators' section contains a program overview for description, structure, a flow chart, teacher notes, lessons plans, and a matrix of educational objectives that the materials cover. These are not specific to Colorado.

Entertaining, the CD is directed toward age five through adult, with interactive arcade games, puzzles, learning activities, and an animated cartoon movie.

The materials are listed as PC and Mac compatible, although our own experience demonstrates that will not operate on Mac OS 10.

This program is suitable for independent study and computer time. There are 20 projects directed toward making a web page from a template.

The Colorado Learning Standard Compatibility usually listed for lessons in this curriculum is not provided for "Ollie Saves the Planet" because of the extensive offerings on the CD ROM. Please refer to the matrix included with the CD.

Packaging

Teacher Worksheet

The purpose of this activity is to demonstrate to students the savings that occur through minimizing the generation of waste by purchasing in larger quantities.

Although packaging is useful and necessary for many reasons, it is a major component of the waste stream. People can reduce the amount of garbage they generate by making thoughtful and informed choices when they buy packaged goods. Additionally, students should realize the connection between their purchases and the decisions product manufacturers make. Because manufacturers try to meet consumer demand, avoiding environmentally unfriendly products helps shift the curve toward more environmentally sustainable products.

This exercise illustrates a method of waste reduction and supports the waste hierarchy. In the waste hierarchy, reducing waste generation has higher environmental benefits than reusing, and reusing has higher benefits than recycling. Reduction, reuse, and recycling and composting, of course, all benefit the environment more than disposal.

Materials

- Scales for each group for weighing food items and containers. (Weights in grams are best)
- Some plastic spoons may be needed
- Containers for each group for emptying out the contents and containers to save and not waste the food
- A food item that is packaged in three sizes for each group

Procedure

Begin by dividing the class into groups of 3-4 students. Then do some creative shopping. At the supermarket, purchase a food item for each group, selecting items that are sold in small, medium, and larger sizes. Purchase the same item in each of the three sizes for each group. Depending on your class budget, there are a wide variety of choices. Items include canned vegetables, tomato sauce, peanuts, potato chips, soft drinks, breakfast cereal, and many others. Record the costs, as the students will need to know the costs of the items they use.

On the day prior to the activity plan to let groups know which items they will investigate. Students should plan for use of the food items after they have been opened. A container to take home or provide for use by others is suggested.

Using a scale, students will weigh each of the three containers of food, open and remove the contents, and then weigh the empty container.

Students will record data on the student worksheet and each group will then calculate the cost per unit weight of food and weight of packaging per unit weight of food

Each group will gather data from three other groups. All will make a comparison of cost per weight as a function of container size and amount of packaging waste as a function of container size

Colorado Educational Standards Supported

Science	1	Students will select and use simple devices related to an investigation
Science	1	Students will use metric units to gather and report results
Mathematics	6	Students will select and use appropriate algorithms in problem solving with decimals
Mathematics	2	Students will present data using tables

Packaging

Student Worksheet

A. Each of your three food items should be measured in a similar manner. Start by recording the cost of the item. Then note the weight of the contents written on the package. Record the amount in grams in the table below. Then empty the food package into a container designated by your teacher. Use a plastic spoon or other item if necessary to completely remove the contents. Then weigh the bag, can, or box that held the food.

B. Complete the table below. Weights in grams rather than ounces are best.

Your Group's Food Item _____	Price	Weight of Contents in Grams	Weight of the Package in Grams
Small			
Medium			
Large			

C. Calculate the cost per gram of food for each food item. Do this by dividing the cost of the item by the weight of the contents.

	Small	Medium	Large
Cost Per Gram			

Which size package is the best deal?_____

D. Calculate the amount of waste per gram of food by dividing the weight of the package by the weight of the food it contained.

	Small	Medium	Large
Grams of package Per grams of food			

2. What is the pattern in the above table? _____

3. Why is it important to buy in larger quantities?_____

_____

E. Get data from three other groups and record the information in the tables below

Cost Per Gram of Food	Small	Medium	Large
Team 1			
Team 2			
Team 3			

Grams of Package Per Gram of Food	Small	Medium	Large
Team 1			
Team 2			
Team 3			

Do you see a consistent pattern in the data from other groups? _____

If so, what is the pattern? Is it the same pattern as your group's?

_____

_____

Paper Recycling

(Adapted from Teachers Resource Guide for Solid Waste and Recycling Education, Association of Vermont Recyclers)

Teacher Worksheet

Background

The single largest component of solid waste is paper. Each person in the United States consumes about 600 pounds of paper each year. To make this amount of paper, about 1,100 pounds of wood is actually harvested. A ton of paper requires about 3,700 pounds of wood. Paper production also uses some other resources, the most important of which are water and energy. Each ton of paper requires 24,000 gallons of water and 8,000 Megawatt-hours of energy.

When paper is recycled, about 15 trees per ton are saved from being harvested. There are substantial savings that include three less cubic yards of landfill space, 50% less water, 96 less gallons of gasoline, and 380 less gallons of oil. The total energy used to make a ton of recycled paper is about 3,200 Megawatt-hours, which is 40% of the total when making paper from virgin wood.

Procedure

- Make an overhead of **Don't Throw your Trees Away.**
- Use the overhead as you introduce the numbers in the tables on the student worksheet.
- Have your students work individually or in groups to do the math exercises on the student worksheet.

Vocabulary

Lime: A white chemically reactive substance obtained by heating limestone.

Soda Ash: (also known as washing soda and sodium carbonate) a white powdery substance, it both occurs naturally and can be manufactured

Salt Cake: (also known as Glauber's salt and Sodium sulfate) appears as white or colorless crystals that dissolve easily in water. It occurs both naturally and is manufactured.

Megawatt: A unit of power equal to one million watts. It is often used as a measure of output from a power station.

Cubic Yard: a unit of volume equal to the volume of a cube measuring three feet (36 inches) on each side.

Colorado Educational Standards Supported

Geography	5.3	Student will describe role of resources in daily life.
Mathematics	3	Students read and interpret tables and charts
Mathematics	6	Students use proper algorithms while problem solving with whole numbers
Science	5	Students describe resource-related activities in which they could participate to benefit their communities.

Paper Recycling

Student Work Sheet

Recipe For 1 Ton of Paper Made From Wood	Recycling Savings From One Ton of Paper
3,700 Pounds of Wood 216 Pounds of Lime 76 Pounds of Soda Ash 24,000 Gallons of Water 360 Pounds of Salt Cake 8,000 Megawatts of Energy	Saves 3 cubic yards of landfill space Saves 12,000 gallons of water Saves 4,800 Megawatts of energy Saves 96 gallons of gasoline Saves 380 gallons of oil

1. Count the number of students in your class.

2. Let's assume you all are about average in terms of paper use, and each student will use about 600 pounds of paper this year. About how many tons of paper will you and your classmates use this year? (1 ton = 2000 pounds)

3. How many pounds of wood were used to make paper for your class for one year?

4. How much water was used to make paper for your class for one year?

5. How much energy was needed to make paper for your class for one year?

6. Now let's assume you and your classmates see the importance of using recycled paper and find you are able to use recycled paper about half the time. Now you are using 300 pounds per year of recycled paper. How many tons is this for your class?

7. How many trees would your class keep from being cut?

8. How much landfill space would be saved?

9. Calculate the savings of oil, gas, water, and energy you and your class would be responsible for in one year by using recycled paper half the time.

10. How many classes are in your school? _____ How many trees would be saved if your entire school started using recycled paper half of the time?

Steps to Recycle

(Adapted with liberty from "Let's Get Organized," Cornell Waste Management Institute, and Waste Wise School Audit, Waste Wise Schools Program, Australia)

Teachers Guide

Background

Setting up a school-recycling program requires commitment and support. This is especially difficult in rural areas where there aren't any buy-back recycling centers to pay for the recyclables and thus there is not a fundraising opportunity, but with some enthusiasm, it can be done. This lesson recognizes that the drop off center is the only opportunity to recycle in the community, and introduces the steps for creating a recycling program to the lower grades.

This exercise is intended to start students thinking about the concept of establishing a recycling program in their classroom and school and to become familiar with their local recycling center and the materials the center accepts. If a recycling program is already set up in the school, through their own observations they can understand the steps to recycle. The lesson walks them through the steps to recycle: 1) What materials can be recycled, 2) Where they go, 3) How students can separate recyclables from their trash, 4) The need for a separate container from the trash can, 5) How different rooms in the school may have different needs for recycling, 6) Who might pick up the recyclables, 7) How they may be transported to the recycling center, 8) and the need for instructions and signs to recognize how to recycle.

This exercise includes as an option a field trip to the recycling center and a tour of the school. You may need to break it up into two days, and get some help with the groups. If a field trip is too troublesome to organize, as an option, invite a guest speaker, or after familiarizing yourself with the materials accepted at the recycling center, bring samples of the items to school in a large shopping bag.

To help you with this exercise, the introductory materials provide a list of local drop-off facilities, maps, the materials accepted, and a list of local contacts. These contacts can inform you if there are any changes to the recycling drop-off centers since these lessons were prepared. Through them you can arrange the field trip. Also, if there is interest in establishing a school recycling program, it is worth asking about their willingness to send a truck or trailer out to pick up recycled materials at the school.

For a detailed guide for setting up a school recycling program, the EPA provides an excellent resource: "Reuse + Recycling = Waste Reduction, A Guide for Schools & Groups," the United States Environmental Protection Agency, Document 2005—313-489. It is available in a readable and downloadable format from the web at

http://www.epa.gov/osw/students/school.pdf

Procedure

1. Schedule a class fieldtrip to the local recycling center.
    - Arrange for a staff member to meet you and to explain how the bins are hauled and where they go from the recycling center, and eventually where the material goes to be manufactured into a new product. Ask about the signs at the recycling center and why they are important.
    - Collect a sample of the types of materials the center collects in a shopping bag (like a sheet of newspaper, a small piece of cardboard, a sheet of office paper, an aluminum can, a steel food can, a plastic bottle, etc.).

    Optional: If a field trip to the center is too difficult, invite a speaker to come into the classroom and show photos of the recycling center. Be prepared with a shopping bag filled with the items that the center accepts. If you are unable to secure a speaker, start with Step 2 after reviewing the vocabulary.

2. Return to the classroom. Remove the items from the shopping bag and ask the students to list them on their student worksheet. An overhead of the worksheet may be useful.
    - As a group, discuss where in the school these items may be discarded. Instruct students on their worksheet. (Some of these places may need some explanation, like the supply room.)

3. With students divided into manageable groups, set up a scavenger hunt and interview. Tour the school to see if where recyclable material may be found in the discards. If there is a recycling program in place, point out the container and its location to the students. If there isn't recycling, have them observe the trash container for the contents and have the students ask the personnel at the location whether the items on their list are often thrown away at that location. Finish the tour by visiting the large trash containers (recycling, too) outdoors.

4. Return to the classroom and discuss what they learned.
    - Ask them for each of the rooms they visited, (and using the overhead) to fill out the student worksheet that identifies where the recyclable material can be found in the school.
    - Ask where they would put a recycling can. Discuss what kind and size they should be, and if someone collected the recyclables every day, how the size would be different than if someone collected the recyclables every week.
    - Ask them how they would inform and remind people to put things in recycling bins and not in the trash.
    - Ask them who picks up their trash now, and where the custodian takes it.
    - Ask them who should pick up the recycling, and whether it too should go to larger containers outside. Cover whether recycling should be mixed together or stay separated.

- Ask them how the recycling gets from the school to the recycling center, concluding that someone must haul it.

Materials

- Transportation to the recycling center for field trip
- Large shopping bag
- Student worksheet

Vocabulary

Dispose: Get rid of by throwing away after use

Garbage: Anything considered worthless that is thrown away

Recycle: The collection of used material that would otherwise be waste to be broken down and remade into new products

Recycling Center: A place to collect materials that that can be remade into new products

Waste: (noun) Materials determined to be of no value and thrown away

Colorado Educational Standards Supported

Geography	5.3	Students will describe the role of resources in their daily life
Science	5	Student investigates and describes uses of non-renewable resources
Civics	2	Identifying what governments do in their school, community, state and nation; what services they provide; and how we pay for them.

Steps to Recycle

Student Worksheet

Type of Item—List ↓	Where can you find that item at the school? Say yes with an X						
	Classroom	Office	Cafeteria	Kitchen	Storage-Truck Unloading Place	Library - Media Room	Playground and Outside