



TREEPEOPLE

THE MAGICAL CITY FOREST

A Teacher's Guide to
the Urban Forest

Grades K-5

TreePeople's Elementary Education Program:
Service Learning Workbook

Developed by TreePeople, Inc.

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THE METROPOLITAN WATER DISTRICT
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WHO WE ARE

TreePeople is an environmental nonprofit that unites the power of trees, people and technology to grow a sustainable future for Los Angeles. Simply put, our work is about helping nature heal our cities.

TreePeople's mission is to inspire, engage and support people to take personal responsibility for the urban environment, making it safe, healthy, fun and sustainable and to share the process as a model for the world.

A MAGICAL CITY FOREST

When we think of forests, we usually think of the mountains. But, we live in a forest – right here in our urban environment. When we view our city as a living forest, we begin to see that all of nature's cycles are busily at work here. Through the eyes of a child, we call this the magical city forest.

TreePeople's vision is to deepen the greening of Los Angeles by inviting the community – youth, local residents, and business people – to establish a functioning community forest in every neighborhood of the city. Creating a functioning community forest involves people engaging with each other to plant and care for trees, and to incorporate "forest-mimicking" technologies into their urban landscape.

What does it look like?

- Community members of all ages and backgrounds join together to take responsibility for the city forest in their neighborhood.
- Well-cared-for trees shade walkways, streets, buildings and recreation areas to reduce energy and water use.
- The use of mulch feeds the soil with nutrients and helps it absorb and hold rainwater.
- Green waste is composted and used to feed the soil.
- Downspouts direct rainwater toward the ground instead of onto pavement.
- Raised berms create sunken gardens that trap rainwater and enable it to seep into the ground.
- Swales – human-made trenches planted with native vegetation – slow the flow of rainwater to help it soak into the ground.
- Rain barrels or cisterns store rainwater for use in dry seasons.
- Native and climate-appropriate plants reduce the need for irrigation.
- Zero waste is created through acts of reducing, reusing and recycling.

ELEMENTARY SERVICE LEARNING PROGRAM

TreePeople's elementary service learning program is designed to assist teachers in providing a program that combines academics in the classroom with service in the community. TreePeople's Eco-tour field trip is just the first step to guiding elementary students to open their eyes and see the forest in the city. With inspiration from what they learned, combined with additional classroom lessons and schoolyard investigations, students can choose an action project to help their school or neighborhood become more of a functioning community forest – a magical city forest!

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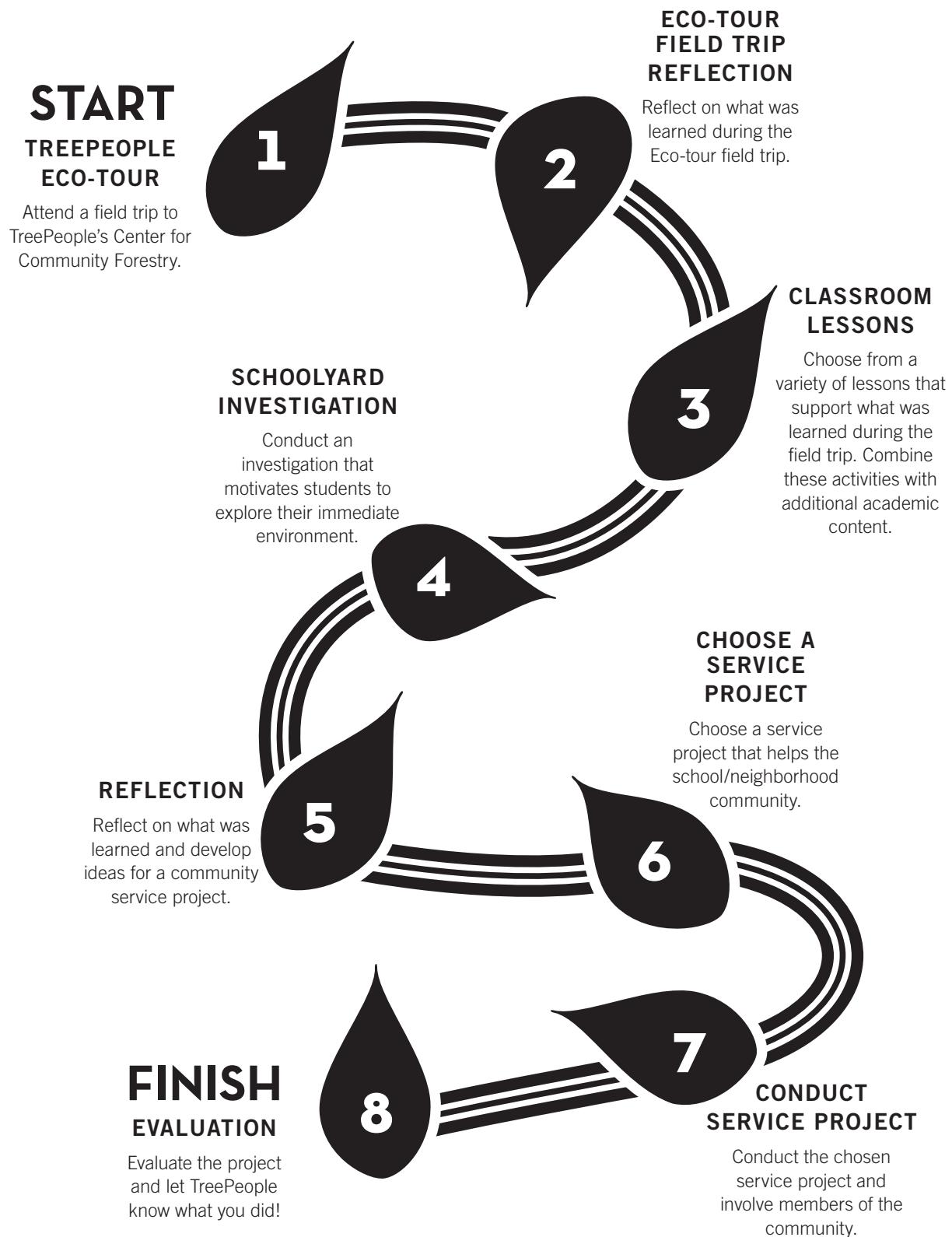
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SERVICE LEARNING PATHWAY



PROGRAM OVERVIEW

The Magical City Forest Teacher's Guide is designed as a service learning teaching tool encouraging further exploration of the city forest and leading to a service learning project. When used, environmental service learning increases students' understanding of local environmental issues and through a sense of empowerment, students make measurable change happen and help to improve the functioning community forest at their school.

Service learning, as defined by the National Commission on Service Learning is:

"...a teaching and learning approach that integrates community service with academic study to enrich learning, teach civic responsibility, and strengthen communities."

HOW TO USE THIS WORKBOOK

Eco-tour Field Trip Reflection

Use this activity, Seeing the Forest for the City (Kindergarten – 1st grade) or Wisdom of the Forest (2nd – 5th grade), to help students recall what they learned on their field trip to TreePeople. Students are invited to learn more and conduct a project that will help the forest at their school and/or in their community.

Classroom Lessons

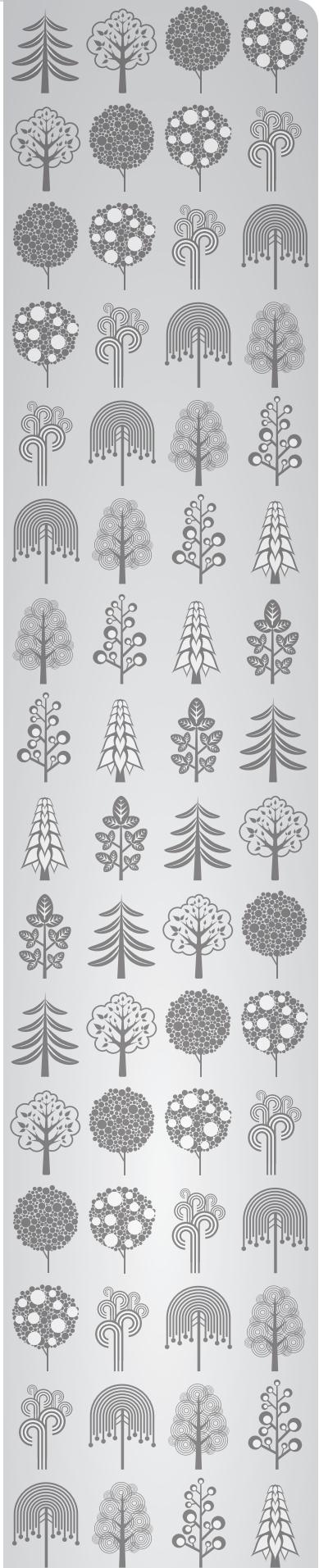
A variety of lessons are provided that teach about water, soil, air, trees and waste reduction. The activities teach students by creating first hand experiences and were developed to support state curriculum framework recommendations. Use these lessons to explore a relevant environmental theme that leads to further exploration.

Schoolyard Investigation

Various investigations are provided that are related to the classroom lessons. The investigations are designed to have students explore their environment up close, gather data, and use what they find to help formulate ideas for making changes. Suggested action projects are included.

Service Learning Project

Materials are provided to guide students on how to take their ideas and conduct a service project at their school or in the larger community. Included is a reflection activity, brainstorming guidelines, task web guidelines, an evaluation tool, and project ideas and resources.





SEEING THE FOREST FOR THE CITY

K - 1ST GRADE

Students are invited to reflect on what they learned on their TreePeople Eco-tour field trip. This activity has students recall the “secrets” of the city forest, and through the use of fun riddles, explore additional living and non-living components. Students then put on their “forest-colored” glasses and explore the forest at their school. At the conclusion of this activity students are asked to explore more about the forest at their school and in their community to then come up with a project that they can do to make the city more healthy and green.

In thinking about the elements that make up a city, one immediately thinks of the non-living components: buildings, streets, cars, telephone poles, sidewalks, freeways and parking lots. What about the living components? What about the forest? The city forest includes trees, gardens, lawns, parkways, vacant lots, and wildlife – animals, birds, bugs and bees. And, of course, the very basic elements – sun, soil, water and air. The ocean is a part of our city forest too. Linked to the mountains by a river system, water is carried through the city to the ocean.

These natural components, including people, are what make up the living, breathing, heart of the city environment – and when everything works together, we have a functioning community forest. Take a good look: Was your city carved out of the forest or was the forest planted in and around the city?

PREPARATION

- Make a copy of the “Forest Riddles” sheet (figure 1). Cut the sheet apart into individual riddles and place in the envelope.

MOTIVATOR

1. In groups, or as a class, have students brainstorm everything they can think of that is part of a city. List these on the board.
2. Identify any natural, or living, components that were listed. Explain that these are the secrets of the city.
3. Hold up the “SECRETS” envelope and explain: In this envelope are riddles that tell more secrets of the city. They are secrets because most people don’t think of them. Let’s see if we can figure them out.”
4. Read each riddle, allowing students to give the answers out loud. Reiterate, after each answer, that it is a part of the city forest.



MATERIALS

- Copy of the Forest Riddles sheet (figure 1)
- Envelope labeled: SECRETS
- Scissors
- City Forest Checklist (figure 2) – 1 per student

SEEING THE FOREST FOR THE CITY (CONT'D)

BOOKS

- A Walk in the City
by Jo Waters
- Be a Friend to Trees
by Patricia Lauber
- Have You Seen Birds
by Joanne Oppenheim
- Nature in the Neighborhood
by Gordon Morrison
- Only the Cat Saw
by Ashley Wolff

PROCEDURE

1. Pass out a City Forest Checklist to each student/group. Go over the different listed items.
2. Explain that in order to see the forest in the city, they need to pretend they are wearing forest-colored glasses. Tell the students to imagine that they are putting on glasses.
3. Using the City Forest Checklist, go for a walk to see the forest at the school. Proceed to identify the living and non-living forest components around the schoolyard.
4. Back in the classroom, explain to the students that TreePeople is asking them to help the city forest. They would like the students to explore the forest at their school or in their community and come up with a project to make the city more healthy and green.

STRETCHING THEIR THINKING

- “What parts of the city forest were missing at our school?”
- “What do you think existed here before the city?”
- “How is a city forest like a mountain forest?”
- “What do you think are ways we could increase the forest in our city?”

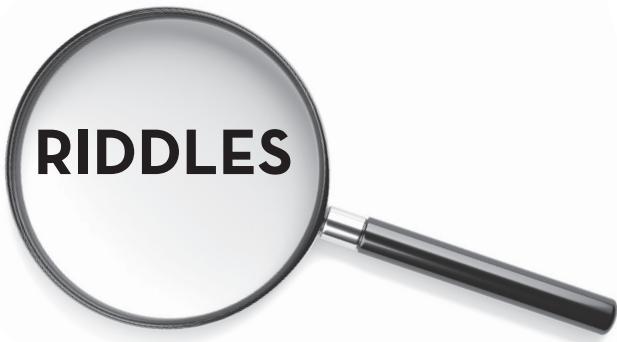
ASSESSMENT

Have students:

- Draw a picture of a city forest.
- Write a paragraph describing one of the secrets of the city forest.

FIGURE 1

FOREST RIDDLES



1. In the city "I'm used each day, to wash, to drink, to fill the bay. When it rains I go down the storm drains as fast as can be, I am on my way to the salty sea. What am I?"
2. In the city I shine warm and bright, up in the morning and gone at night. I give you energy and help plants to grow in the spring & fall when seeds we sow. What am I?
3. In the city you feel a cool breeze and the wind gently flowing through the tall trees. I'm hard to see, but without a doubt, I'm in your lungs when you breathe in and out. What am I?
4. In the city I can always be found in a garden, a field or on a playground. I can be many colors and smell very sweet; put your nose to my blossom; mmm what a treat. What am I?
5. In the city I grow strong and tall. I can have fruit in the summer and gold leaves in the fall. I'm a canopy of shade on a hot summer day; I'm home to wildlife and a fun place to play. What am I?
6. In the city I glide through the sky. With my feathery wings it's easy to fly. I'm known for twittering a beautiful song that you how happy I am all day long. What am I?
7. In the city I'm many shades of brown. I'm in the garden, under a tree or just on the ground. I'm everywhere when you dig down deep, and when I get wet, I'm the mud on your feet. What am I?
8. In the city I'm fluffy and billowy white. On a bright summer day I'm a beautiful sight. I can get black and dark and the sun you can't see. I'm the source of rain; droplets fall from me. What am I?
9. In the city I'm loved wherever I go, because my wings are as colorful as a rainbow. I begin as a caterpillar, and boy, do I eat. Then out of a cocoon I emerge, the cycle is complete. What am I?
10. In the city I'm found where it is dark and damp, on rotting wood or a dead plant. I have a short stem and a puffy round cap. I'm known as a fungus, how about that? What am I?
11. In the city I'm beyond the beach of sand. I'm found in the water, not on the land. I swim in the salty sea so deep. I have fins and a tail, not hands and feet. What am I?
12. In the city I'm everywhere if you look. I'm the greenery around, in every nook. I need water, sun and air to survive. With some love and soil, I will really thrive! What am I?
13. In the city I live in a tree or a park and I scurry around and make the dogs bark. I like to gather up seeds, nuts, and fruit. I have a bushy brown tail, and boy am I cute. What am I?
14. In the city I'm as small as can be. I weave a fine web and sit quietly. When I've caught a fly in my web, I eat my dinner and then go to bed. What am I?
15. In the city I collect on the ground. I fall from the trees and bushes all around. I'm leaves and branches, seed pods and more. I'm the stuff that can be found on a forest floor.
16. In the city I'm many sizes and shapes. I'm many flavors, colors and tastes. I grow on trees, bushes and out of the soil, you see. You can eat me fresh, or even cook me. What am I?



RIDDLE ANSWERS

1. Water
2. Sun
3. Air
4. Flower
5. Tree
6. Bird
7. Dirt
8. Clouds
9. Butterfly
10. Mushroom
11. Fish
12. Plants
13. Squirrel
14. Spider
15. Mulch
16. Fruits/Vegetables

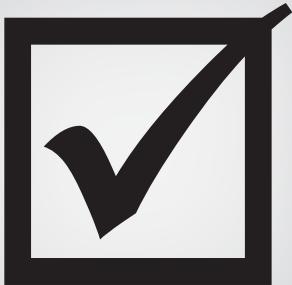
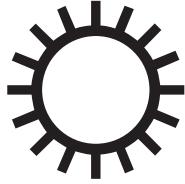
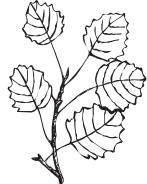
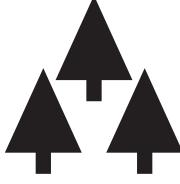
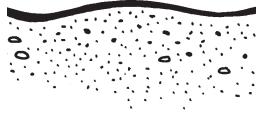
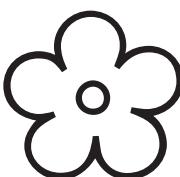


FIGURE 2

CITY FOREST **CHECKLIST**

SUN	PLANTS	BIRDS
		
TREES	PETS	SOIL
		
PEOPLE	WATER	GRASS
		
AIR	FLOWERS	INSECTS
		

WISDOM OF THE CITY FOREST

2ND - 5TH GRADE

Students are invited to reflect on what they learned on their TreePeople Eco-tour field trip. This activity has students recall the cycles in the city forest, and through the use of play acting, explore how cycles work in a natural forest. At the conclusion of this activity students are asked to explore more about the forest at their school and in their community to then come up with a project that they can do to make the city more healthy and green.

In natural ecosystems everything – energy, water, air, and nutrients – flows in a cycle. The forest ecosystem is the perfect example of nature in balance, as everything is recycled and nothing is wasted. This balance – the wisdom of the forest – is a dynamic set of processes that make up cycles.

Using the forest as a model, we can show how natural cycles are disrupted in our city forest, and as a result, find ways to repair them.

PREPARATION

- Take a small box and place the paper with the drawn circle inside for a Wisdom of the Forest box.
- See page 10 for a sample script for the Forest Play. Make a space to perform the play in the classroom, or go outside.
- Make a copy of the Cycle Character Cards (figure 3). Put the job description on the back, color or laminate them (optional).

MOTIVATOR

1. To recall what they learned on the field trip, ask the students if they can guess what the “wisdom of the forest” is.
2. Prompt the students with the following: “We learned something special about a forest and the answer is inside this box! But, before we open it, let’s see if we can figure out the answer.”

PROCEDURE

1. Explain to the students that they will try to become a forest right in the classroom. Each person is going to become part of a forest, and each part has a very important job to do. They will learn how each part of the forest functions.



MATERIALS

- Small box
- Piece of paper with a circle drawn on it
- Copy of Cycle Character Cards (figure 3)

WISDOM OF THE CITY FOREST (CONT'D)

BOOKS

- All Wet, All Wet
by James Skofield
- Oak & Company
by Richard Mabey
- What are Forests?
by Lisa Trumbauer

2. Proceed to choose multiple students for the different parts ensuring that everyone gets to participate. Instruct them as follows:
 - Trees – “Your job is to make leaves and seeds and form a canopy of shade. Stand tall and push your hands up and out.”
 - Pinecones – “Your job is to drop seeds to the soil and sprout new trees. Twirl around, drop to the ground then push up to become a tree.”
 - Leaves – “Your job is to grab sunlight, water and air to make food for the tree and fall to the ground to become mulch. Wave your hands and drop to the ground.”
 - Mulch – “Your job is to soak up the rain and break down to become soil. Sit on the floor below the trees.”
 - Worms – “Your job is to eat dead leaves and mulch and make them into soil – food for the trees. Wiggle around and making munching noises.”
 - Soil – “Your job is to hold tree roots, soak up rain, and feed the soil. Lay on the ground below the trees and make slurping noises.”
 - Rain – “Your job is to fall from the clouds, seep into the soil and provide water for the forest. Bring your arms up and down, slowly moving your fingers.”
 - Sun – “Your job is to give energy to the tree and help make clouds. Arms up and form a circle above your head.”
3. As you read the script, have the students act out their part when they hear their character's name. Be sure to emphasize the word “circle.”

In a forest, the tall trees grow leaves. When the leaves fall to the ground as mulch, the worms break them down to become soil. The soil provides food for the tree, so the tree can make new leaves. The leaves fall to the ground as mulch. The worms break them down the leaves and mulch to become soil. The soil provides food for the tree so that it can make new leaves. Nothing is wasted. This goes on and on like a big circle.

In a forest, rain falls from clouds to hit the soft mulch where it flows into the soil to feed the trees. When the sun shines some of the water goes back up into the sky where clouds form again. The rain falls from clouds to hit the soft mulch where it flows into the soil to feed the trees. When the sun shines some of the water goes back up into the sky where clouds form again. Nothing is wasted. This goes on and on like a big circle.

In a forest the trees grow pinecones that drop seeds that twirl down to the soil. The seeds are fed by soil, the rain and the sun helping them to grow into a new tree. That tree grows pinecones that drop seeds that twirl down to the soil. The seeds are fed by soil, the rain, and the sun helping them to grow into a new tree. Nothing is wasted. This goes on and on like a big circle.

WISDOM OF THE CITY FOREST (CONT'D)

4. Finish with a big applause for everyone! Have students return to their seats.
5. Explain how the different parts of the forest work constantly, over and over again.
6. Ask the students if they know what the “wisdom” of the forest is. Take answers before revealing the circle in the box. Explain, as needed, that everything in the forest moves in a circle. Everything is recycled, nothing is wasted. It re-circles over and over again. Use the character cards to illustrate the circle – tree – leaves – mulch – worm – soil – tree.
7. Explain to the students that TreePeople is asking them to help the city forest. They would like the students to explore the forest at their school or in their community and come up with a project to make the city more healthy and green.

STRETCHING THEIR THINKING

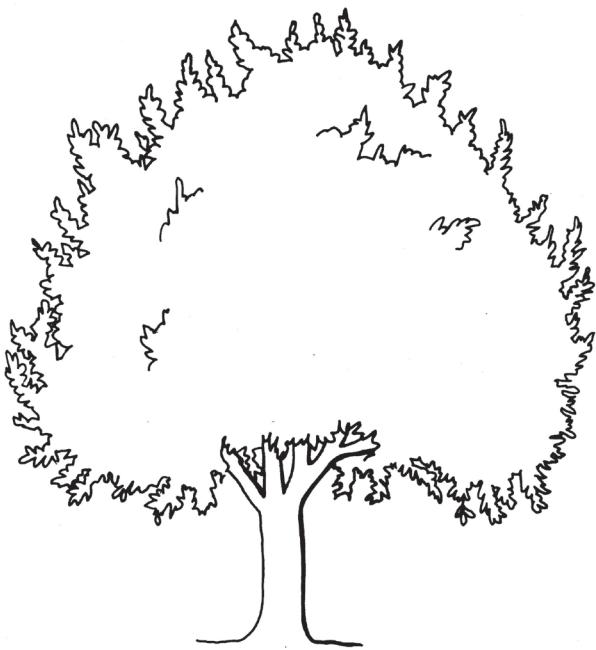
- “In a forest, the leaves of a tree fall to the ground as mulch that breaks down to become soil. What happens to leaves in the city?”
- “In a forest, water flows clean on its way to the ocean. What happens to water in the city?”
- “Using the forest as a model, what ideas do you have to make our city forest function more like the mountain forest?”

ASSESSMENT

Have students:

- Draw one of the cycles using their character card.
- Write a paragraph describing one of the cycles in a forest.

FIGURE 3: CYCLE CHARACTER CARDS



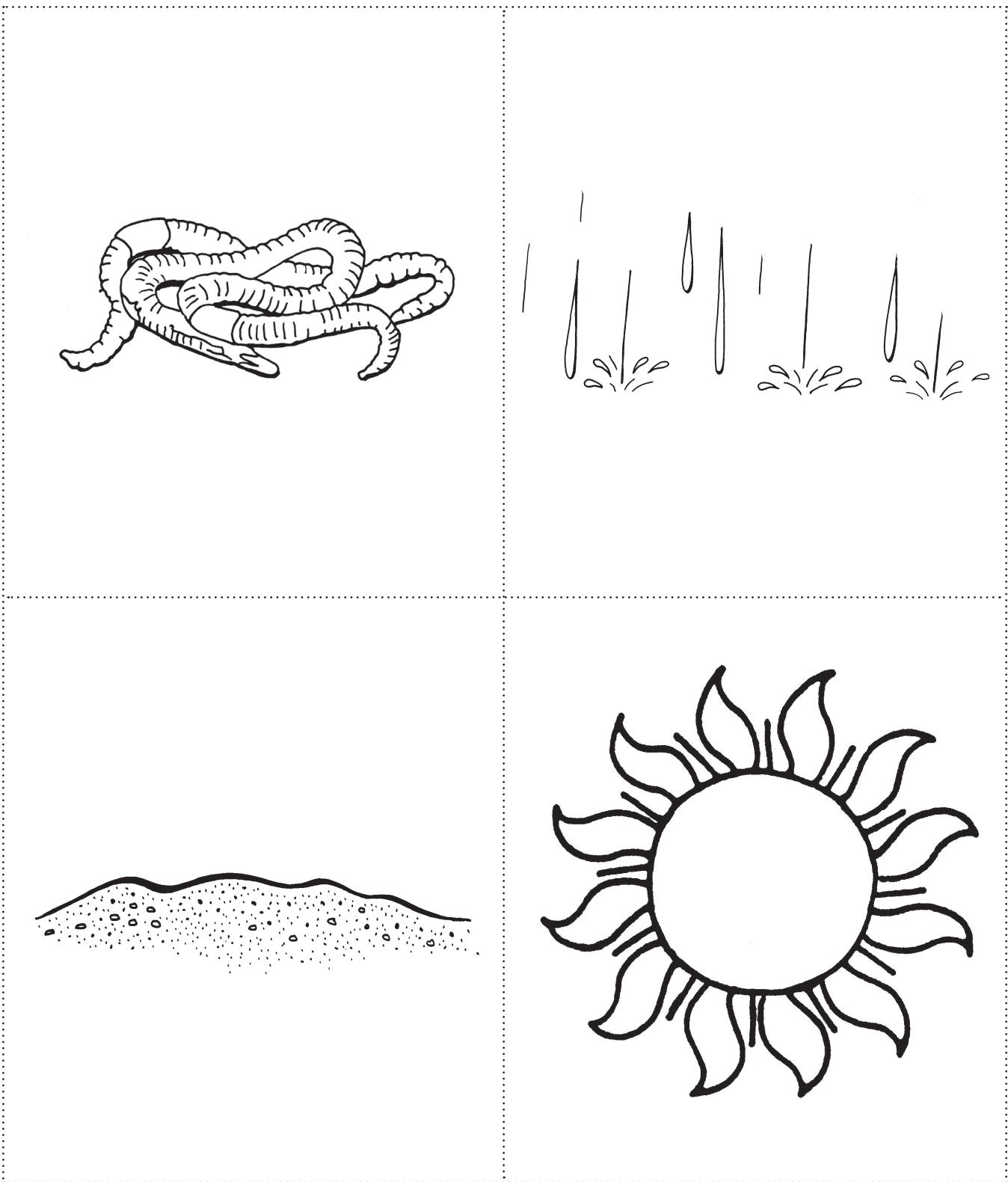
Trees: "Your job is to make leaves and seeds and form a shade canopy. Stand tall and push your hands up and out."

Pinecones: "Your job is to drop seeds to the soil and sprout new trees. Twirl around, drop to the ground then push up to become a tree."

Leaves: "Your job is to grab sunlight, water and air to make food for the tree and fall to the ground to become mulch. Wave your hands and drop to the ground."

Mulch: "Your job is to soak up the rain and break down to become soil. Sit on the floor below the trees."

FIGURE 3: CYCLE CHARACTER CARDS



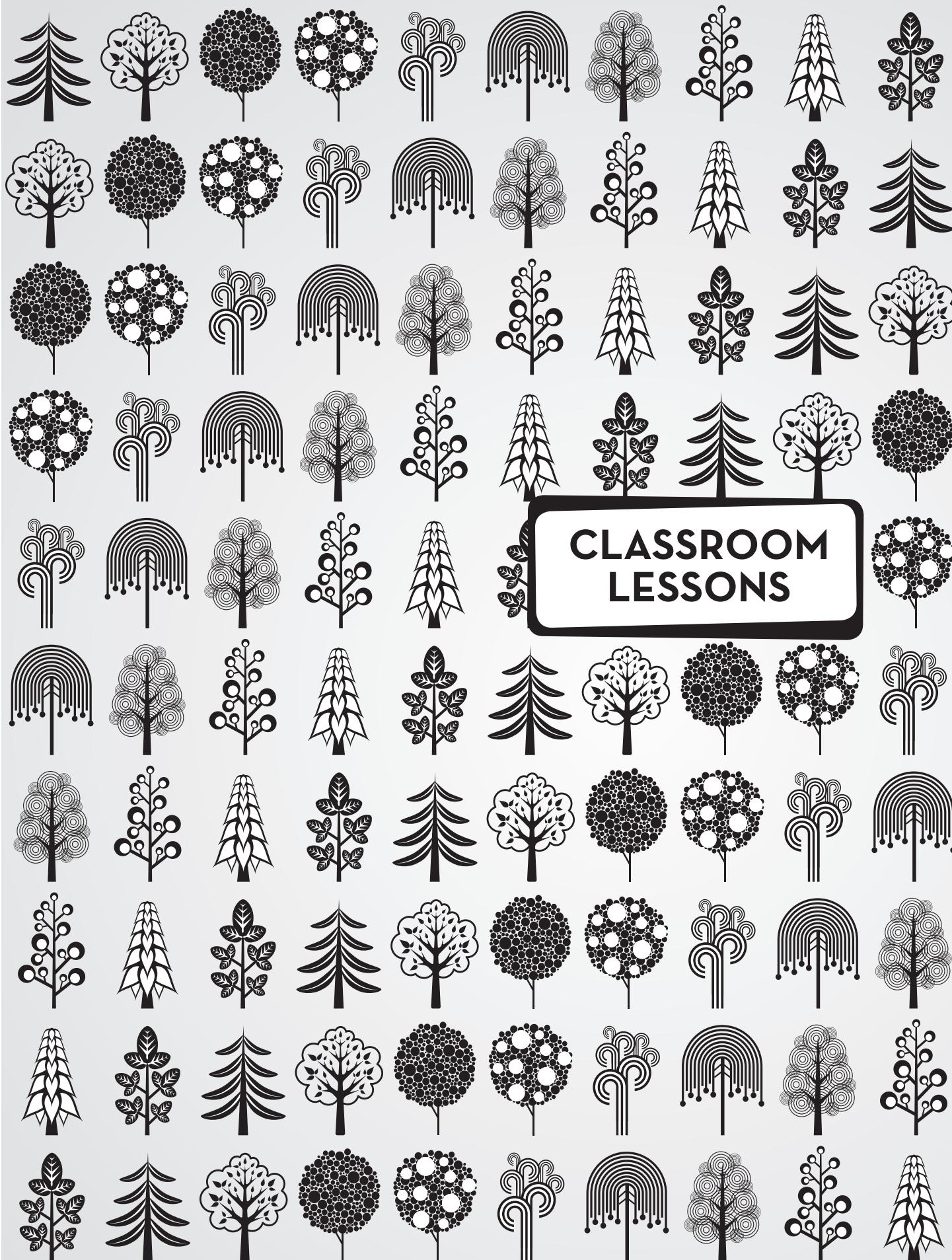
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Rain: “Your job is to fall from the clouds, seep into the soil and provide water for the forest. Bring your arms up and down, slowly moving your fingers.”

Sun: “Your job is to give energy to the tree and help make clouds. Arms up and form a circle above your head.”





**CLASSROOM
LESSONS**



WATERDROP'S JOURNEY

Water is an essential resource in our city forest. Trees, birds, animals and people in our city forest depend on water to live. Water is the largest “cycle” on earth and is powered by the force of gravity and the heat of the sun.

Water endlessly re-circulates as it moves from atmosphere to earth to ocean and back to atmosphere. Water falls to the earth as rain, snow, sleet or hail. Some of the water is caught in leaves and is either evaporated back up into the sky or flows off the leaves, down the trunk, seeps into the mulch and on down into the soil. Some of the water percolates deeper to become groundwater, and some gathers to become streams that flow into rivers, lakes and oceans. Once there, the sun’s heat then returns some of the water back to the sky through evaporation.

This isn’t the only water cycle. Water also filters through other living things such as people and animals.

Water covers 71 percent of the Earth’s surface and makes up 75 percent of our bodies. To stay healthy, we must keep all water as clean as possible. Because water is a universal cleanser and solvent, it is not only used to wash away visible pollutants, but also dilutes many invisible things such as pesticides and fertilizers. These practices have an impact on the ocean ecosystem and can affect the health of all living things.

Learning about water’s value and our essential need for water can help to build respect for this incredible resource.

PREPARATION

- Make a copy of the “Message From Waterdrop” (figure 4). You may want to attach it to an existing postcard and add a stamp to make it look more authentic.
- Photocopy a postcard for each student using the Postcard Template (figure 5).
- Make a “Waterdrop” using a blue balloon filled with water or sand. Using a black marker, draw a face.



KEY CONCEPTS

- Water cycle
- Uses and importance of water

MATERIALS

- Copy of Message From Waterdrop (figure 4)
- Postcard with water-related picture (optional)
- Postcard template (figure 5)
- Blue balloon or other representation of a waterdrop – 1 per student



WATERDROP'S JOURNEY (CONT'D)

BOOKS

- A Cool Drink of Water
by Barbara Kerley
- A Drop of Water
by Walter Wick
- Linnea's Windowsill Garden
by Lena Anderson
- Raindrop
by Larry Dane Brimner
- Rivers & Lakes
by Sarah Levete
- The Snowflake: A Water Cycle Journey
by Neil Waldman
- This is the Rain
by Lola M. Schaefer

MOTIVATOR

1. Tell the students that you received a special postcard in the mail. Read aloud the Postcard From Waterdrop describing the water cycle, the different forms of water, and inviting them to explore how water is important to them, their school, their community and the Earth.
2. Introduce "Waterdrop" to the students (the water balloon representation).
3. Arrange students in a circle. Using the water-filled balloon, pass it from student to student as you reiterate the different steps of the water cycle described in the postcard.

PROCEDURE

1. As a class, brainstorm all the different ways that Waterdrop is used, in all its forms, and list on the board. Use the prompts on page X to help with student ideas.
2. Explain to the students that they will create a postcard from their own Waterdrop. They will write a letter describing another Waterdrop adventure. Invite them to create a picture on the back of the postcard.
3. Pass out a postcard template to each student. Explain that they are to:
 - Choose how Waterdrop visits their home, school, or community (refer to the brainstormed list).
 - Write a letter from Waterdrop describing their adventure/use.
 - Draw, color, or take a photo of their Waterdrop for the backside of the postcard.
4. Once the assignment is complete, have students read their postcard from Waterdrop.

STRETCHING THEIR THINKING

- "How are people a part of the water cycle?"
- "What do you think would happen if we had no water?"

ASSESSMENT

Have students:

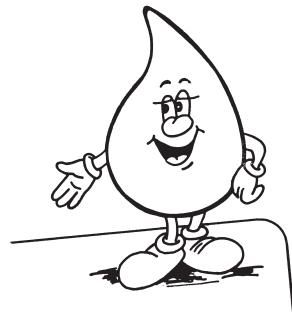
- Draw a picture of the water cycle and label the components.
- Write a paragraph describing what they observed and how it is a part of the soil cycle.

SUGGESTED INVESTIGATION

- Water Flow Investigation

FIGURE 4

MESSAGE FROM WATERDROP



Dear Students,

Hi! This letter is from your friend Waterdrop. I thought I would send you a letter to tell you about one of my many travels.

Just the other day I was up in a cloud high above the mountains when I suddenly got so heavy that I fell all the way down to the Earth as rain. I fell onto the leaf of a tree! From there I slid down the branch, onto the trunk, and then right down into the soft leaves lying on the ground below. I dripped down the leaves into the soil, seeping down and down until I met up with a big group of water drops. We formed an underground pool of water that was moving into a stream. Soon, I was floating along with lots and lots of water drops forming a big river. I flowed as a river all the way to the ocean! Being a water drop in the ocean was pretty exciting when all of a sudden the heat of the sun caused me to evaporate and take me back into the sky to become part of the clouds again!

How is that for an adventure?

But that is only part of my story! I am almost everywhere! I can be cold like an ice cube or snow. I can be very hot like boiling water. I can disappear when the sun pulls me up into the clouds. This is called evaporation. In the clouds I can join together with other water drops. This is called condensation. When I fall from the clouds as rain it is called precipitation.

I can be used for many things. The average person in Los Angeles uses 180 gallons of water per day! That's a lot of water drops!

I am even a part of you!

So, how important am I to you, your school, your community, or the Earth?

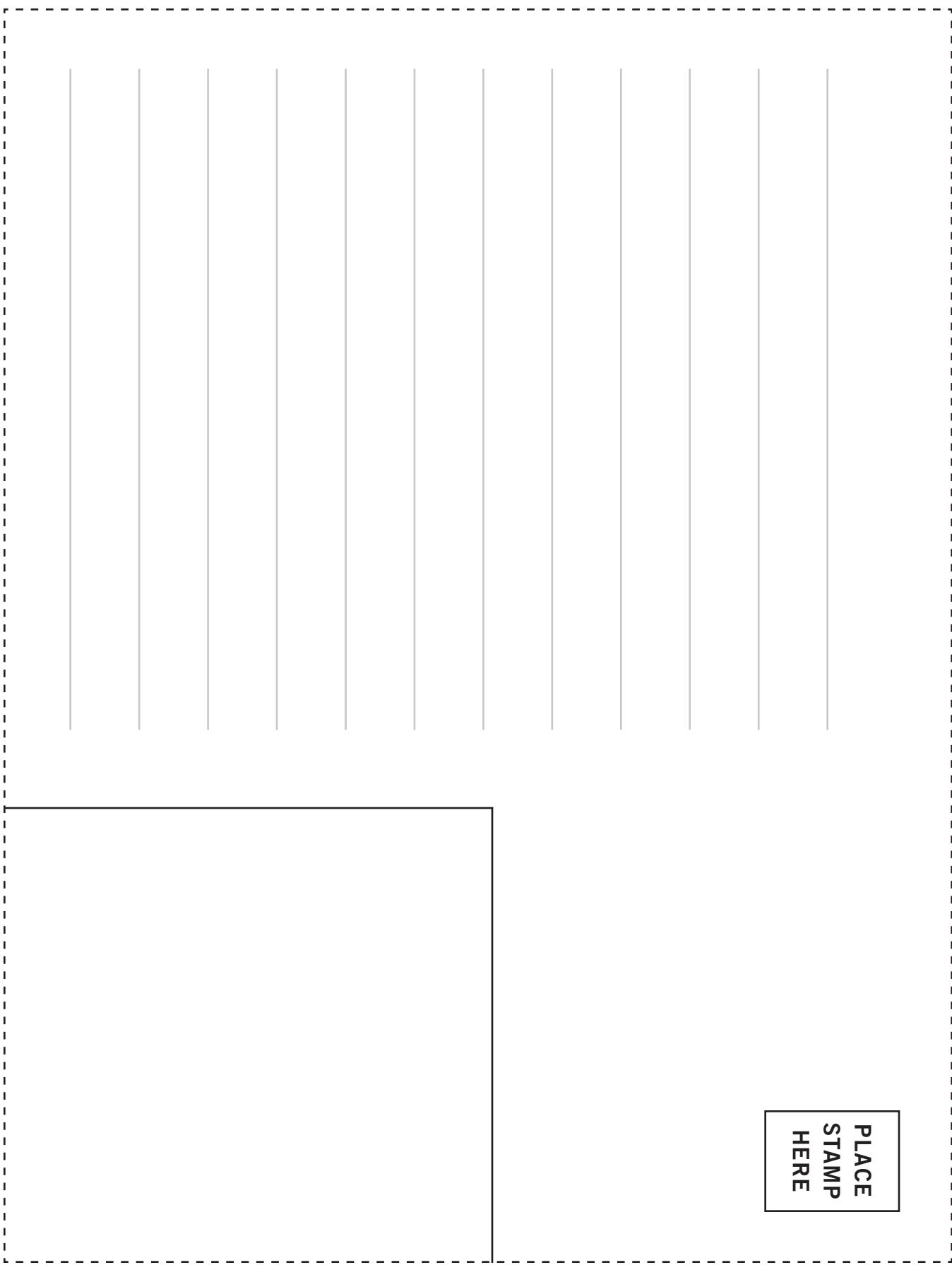
Let me know,

Waterdrop

WATERDROPS

- Drinking water
- Ice cubes
- Hot water for tea and coffee
- Rain
- Water food crops and orchards
- Water hydrants to put out fires
- Swimming pools
- River home to fish and other wildlife
- Ocean home to fish and other wildlife
- Snow
- Shower or bath

FIGURE 5: POSTCARD **TEMPLATE**



WATER DESTINATION RELAY

The city of Los Angles sits within a semi-arid region of little rainfall. Los Angeles is so beautiful; it has attracted lots of people who make it their home. People use lots of water. Unfortunately, to make things worse, many people waste water by hosing their driveways instead of sweeping them, planting really thirsty plants, taking super-long showers and letting the water run when they brush their teeth. Because of this, we must seek outside sources of water. The task is enormous and complex because we are surrounded by ocean, mountains and desert. Not only does our water need to travel long distances, but it then must be distributed over a large area.

We receive our water from four sources. Fifteen percent of our water supply comes directly from local groundwater. The remainder comes via aqueducts from the Sacramento River (California Aqueduct), the Eastern Sierras (Owens River Aqueduct), and the Colorado River (Colorado River Aqueduct). After going through a filtration plant, the water is then distributed to homes and businesses by the City of Los Angeles Department of Water and Power.

In a household, water can be classified by “inside” water use (sinks, toilets, showers, washing machines), and “outside” water use (hoses, sprinklers, spigots). Wastewater from inside use is carried out by underground sewer pipes that go to a Wastewater Treatment Plant. There, water goes through a process of separating solids from liquids. The liquids are treated before being reused or sent out to the ocean.

The outside water is considered run-off, and is carried to the ocean by storm drains. It begins in the streets with gutters that channel the run-off. At the end of many gutters is a catch basin. These are rectangular openings that collect water and debris from the street and carry them down into the storm drains. Storm drains, large tunnels under the street, carry the water and the debris to the Los Angeles River, which then empties directly in the ocean. Unlike inside wastewater, outside run-off receives no treatment before entering the ocean.

As our cities continue to sprawl, the increase in paved areas causes enormous run-off, erosion damage to the watershed, and storm water problems. Instead of rainwater being caught and slowed down by trees and shrubs and slowly percolating into the mulch and soil (like in a forest), rainwater hits asphalt, concrete, or bare compacted ground with full impact and rushes off into the storm drain system. Though the storm drain system was designed to carry rainwater to the ocean, it carries much more.



KEY CONCEPTS

- Where water comes from, and goes, in an urban environment
- Water pollution
- Water waste
- Water conservation

MATERIALS

- Watering can
- Copy of Aqueduct Map (figure 7)
- Copy of Water Treatment Map (figure 8)
- Copy of Storm Drain Map (figure 9)
- Index cards
- 2 Buckets (one filled with water)
- 9 Large cups
- Bits of trash (can, paper, plastic six-pack ring, etc.)
- Dish soap
- Soy sauce

WATER DESTINATION RELAY (CONT'D)

BOOKS

- The River Run Wild:
An Environmental History
by Lynne Cherry
- Water Pollution
by Sean Price
- Why Should I Save Water?
by Jen Green

Anything left on the ground that could wash into the streets, including litter, yard trimmings, grease, pesticides, animal droppings, smog, chemicals, paint, and motor oil, ends up in the catch basins and into the storm drains. The drains continually pour run-off directly onto the beach or within the surf line, resulting in high bacteria counts in the surf zone – not only creating an unhealthy situation for swimmers and marine life, but wasting the precious water that we so badly need.

PREPARATION

- Plan to teach students how to simulate the sounds of a rainstorm with their hands and feet. First they all rub their hands together, then move on to snapping their fingers, to clapping hands, to slapping thighs, to stomping feet, to slapping thighs, to clapping hands, to snapping fingers, finally to rubbing hands together.
- Find three areas at your school to “rain” on:
 - One area that allows water to soak into the soil, under a tree, or bush that has a blanket of fallen leaves.
 - One area that is hard, compacted soil that has water sliding off to a gutter, drain or remaining in one place.
 - One area of concrete or asphalt that has water sliding off to a gutter, drain or remaining in one place.
- Prepare an area outside to conduct the Water Destination Relay (see figure 6). You may want to mark each spot with masking tape.

MOTIVATOR

1. Take students outside to a part of the city forest. Have students imagine they are in a mountain forest with trees and dirt all around.
2. Have them create a rainstorm and see what happens when it rains in the forest. (The rain should soak down into the mulch and dirt.) Instruct students in how to make the sounds of a rainstorm with their hands and feet.
3. Explain to the students that you are going to pour water from the watering can and pretend to be the rain as they make the rainstorm sounds.
4. Take the students to a compacted soil area. Ask students to imagine they are in a city forest with hard, compacted soil all. Have them create a rainstorm and see what happens when it rains on hard soil in the city. (The rain should stay there or slide away toward a gutter/drain.)
5. Pour water again as students make a rainstorm with their hands and feet.
6. Take the students to a concreted area. Ask students to imagine they are in a city forest with concrete all around. Have them create a rainstorm and see what happens when it rains on concrete in the city. (The rain should stay there or slide away toward a gutter/drain.)

WATER DESTINATION RELAY (CONT'D)

7. Pour water again as students make a rainstorm with their hands and feet.
8. Ask the students:
"How is the rainfall in the city forest different than the rainfall in the mountain forest?"

PROCEDURE

1. Back in the classroom, explain to students that most of the rain that comes down in our city is wasted – it either slides off of hard, compacted soil or concrete and asphalt into drains that lead to the street. When water is wasted we have to bring it to Los Angeles from faraway places. Discuss the Aqueduct system that brings water to Los Angeles. Show the Aqueduct map (figure 7).
2. Explain that once water arrives in Los Angeles, it is cleaned and then sent through pipes to our homes. We use it for many things. Ask the students for different ways they use water and record them on separate index cards.
3. Show students the Wastewater Treatment Map (figure 8). Discuss how water from inside their home flows into pipes that go to a Wastewater Treatment Plant and then to the ocean.
4. Show the Storm Drain Map (figure 9). Discuss how water outside our home flows down the gutter to the storm drains. Ask the students for different ways they use water outside their home and record them on separate index cards.
5. Explain to the students that they will be doing a relay to show the two water systems in our city that go to the ocean.
6. Divide the class into the following groups:

Line #1

- 1 student represents the house pipe
- 1 student represents the sewer pipe
- 1 student represents the wastewater treatment plant
- 1 student represents the sewer outfall

Line #2

- 1 student represents the gutter
- 1 student represents the catch basin
- 1 student represents the storm drain pipe
- 1 student represents the L.A. River

WATER DESTINATION RELAY (CONT'D)

7. Arrange the groups as in figure 6. Put a bucket of water at the beginning of the relay to represent used water and an empty bucket at the end of the relay to represent the ocean. Hand each student along the relay a cup. Place a cup in the bucket of water at the beginning of the relay.
8. Give one of the index cards (with a water use) to each of the remaining students. Explain that they will walk up to the bucket of water, read out loud the water use on the index card and, using the cup, fill it with water out of the bucket and pour it into the cup of the correct water destination. Example: “brushing teeth” would pour a cup of water into the “house pipe” cup.
9. Explain that the “house pipe” cup would then pour water into the “sewer pipe” cup. They would continue down the line pouring water from cup to cup until water is poured into the ocean bucket.
10. Rehearse each relay line.
11. Add bits of trash (plastic bag, 6 pack soda ring, can) along the “outdoor water” relay line; as well as soy sauce (to represent motor oil). Add dish soap to the “outdoor water” relay line when “washing the car” is read.
12. After all the index cards are read, observe the ocean bucket at the end of the relay.

STRETCHING THEIR THINKING

- “How is trash and pollution left on the ground harmful to our ocean?”
- “What do you think we can do to minimize the amount of pollution in our water system?”
- “How is water that flows over concrete or across hard soil wasted?”
- “What can we do to ensure that water isn’t wasted?”
- “What can we do to conserve water so that it is not wasted down the drain?”

ASSESSMENT

Have students:

- Illustrate one of the paths that water takes: inside-use or outside-use water
- Write a paragraph describing the path water takes from the bathroom sink or the path water takes from the hose spigot.

SUGGESTED INVESTIGATIONS

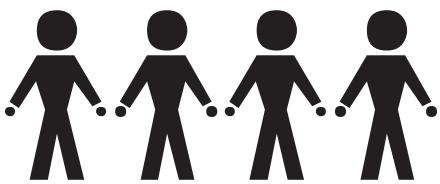
- Water Flow Investigation
- Soil Investigation
- Waste Investigation
- Classroom Eco-Investigation

Sample Ideas for the "Stretching Their Thinking" Questions

- Sweep sidewalks, don't use a hose.
- Put trash in a can with a lid.
- Direct water flow away from the gutter toward the garden when washing a car.
- Use climate-appropriate plants in the garden, that don't need a lot of water.
- Remove concrete and plant trees and shrubs.
- Use mulch on bare dirt and under trees and shrubs.
- Pick up after pets. Dispose of their droppings down the toilet or in a trash can.
- Set up a drip irrigation system to water plants. Irrigate carefully so that you don't have run-off.
- Report full catch basins to the Department of Public Works, Bureau of Sanitation.
- Don't buy 6-pack sodas with plastic rings. If you do, cut the rings apart and dispose of them properly.
- Drop off used motor oil at garages that recycle it.
- Take toxic waste to authorized hazardous materials drop-off centers.
- Fix leaks in cars, or place a pan with sand under the leak.
- Keep cars tuned-up.
- Reduce the amount of resources you use and don't litter.
- Conserve water while bathing, brushing teeth, and washing dishes.
- Don't wash paint brushes in the gutter.

FIGURE 6

RELAY SET-UP



storm
drain
line



WATER BUCKET

wastewater
treatment
line



GUTTER

wastewater
treatment
line



HOUSE PIPE



CATCH BASIN



SEWER PIPE



STORM DRAIN



WASTEWATER
TREATMENT PLANT



FLOOD CONTROL
CHANNEL



SEWER OUTFALL



OCEAN BUCKET

FIGURE 7: AQUEDUCT MAP

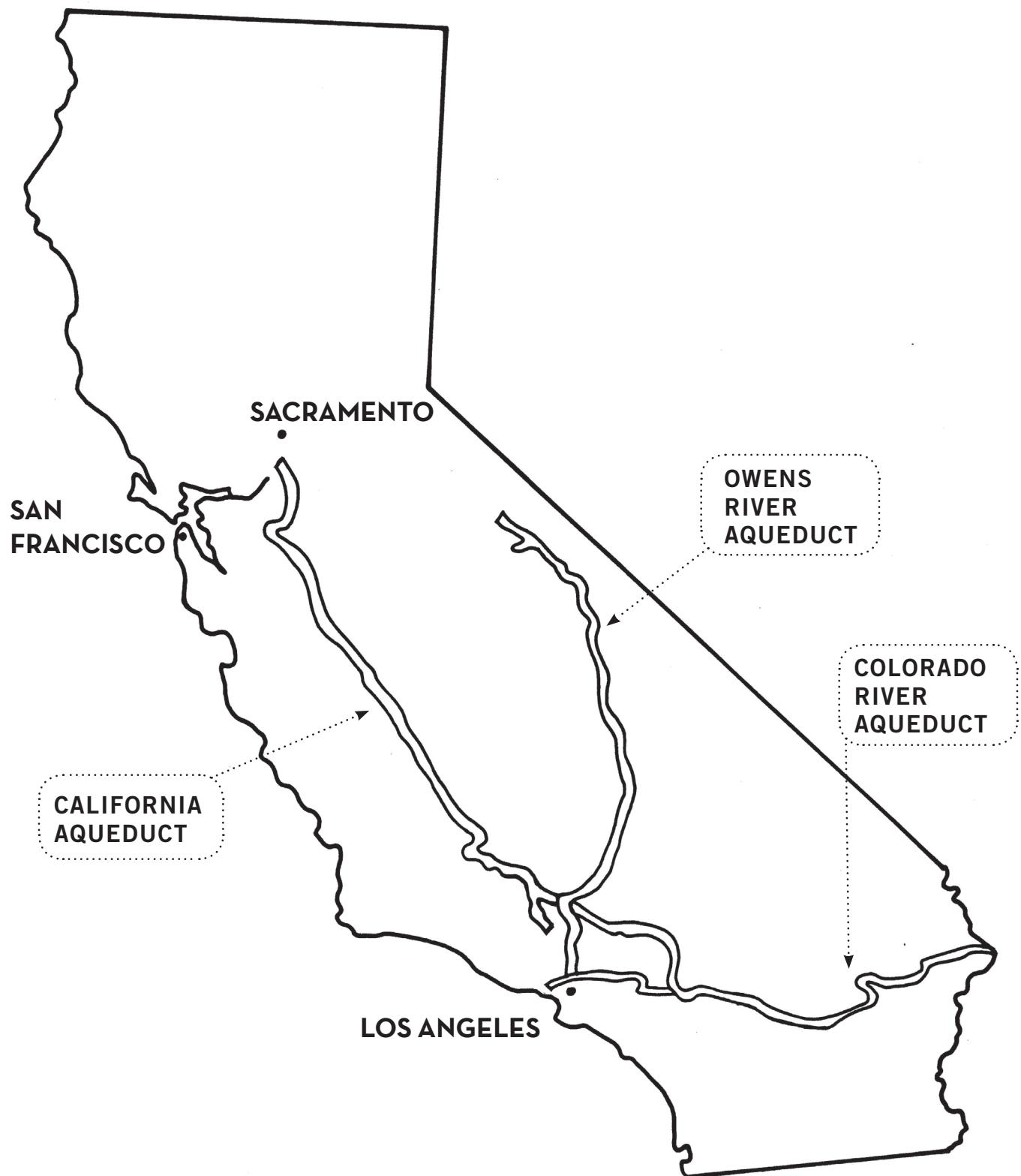


FIGURE 8: WASTEWATER TREATMENT MAP

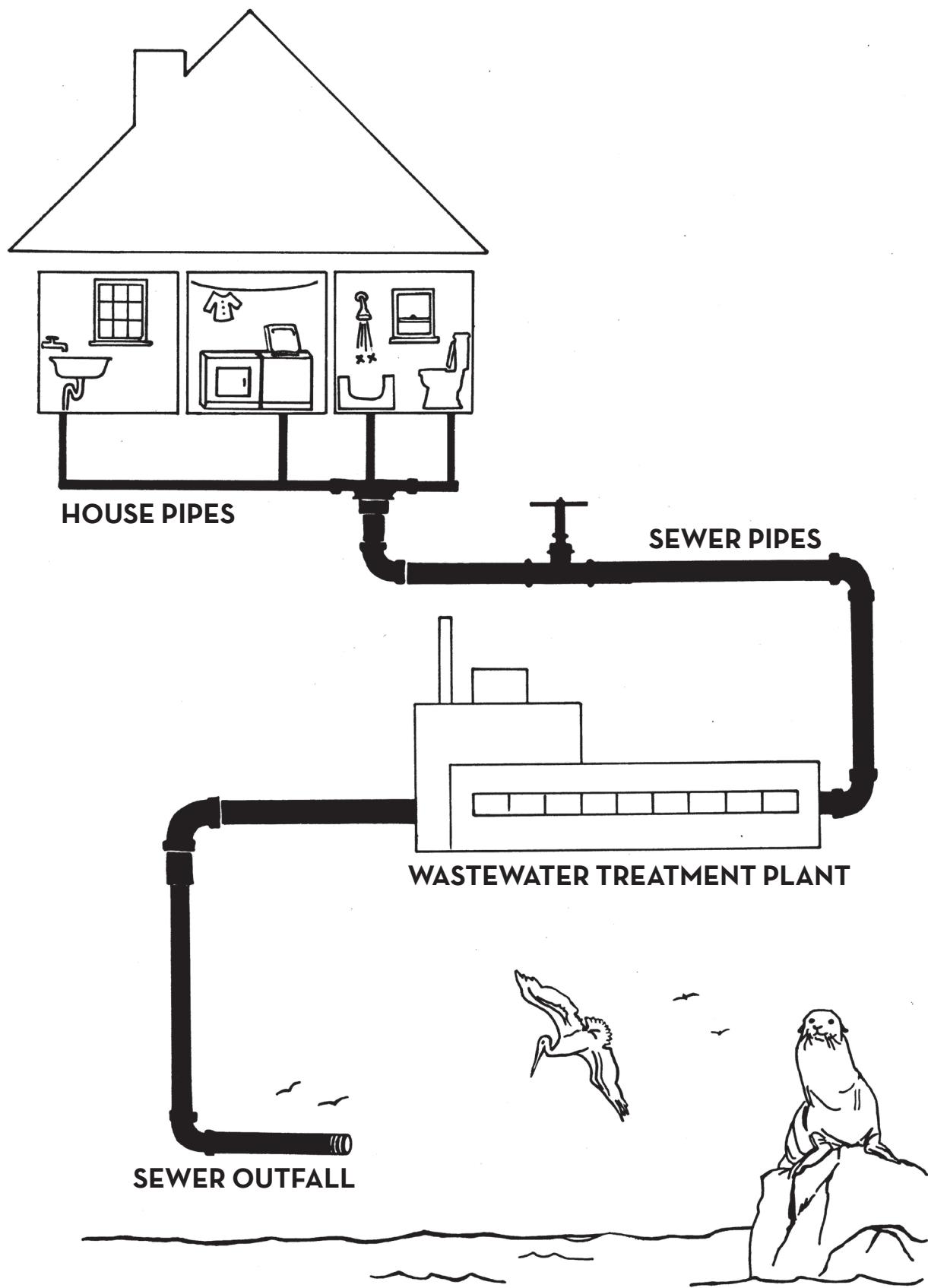
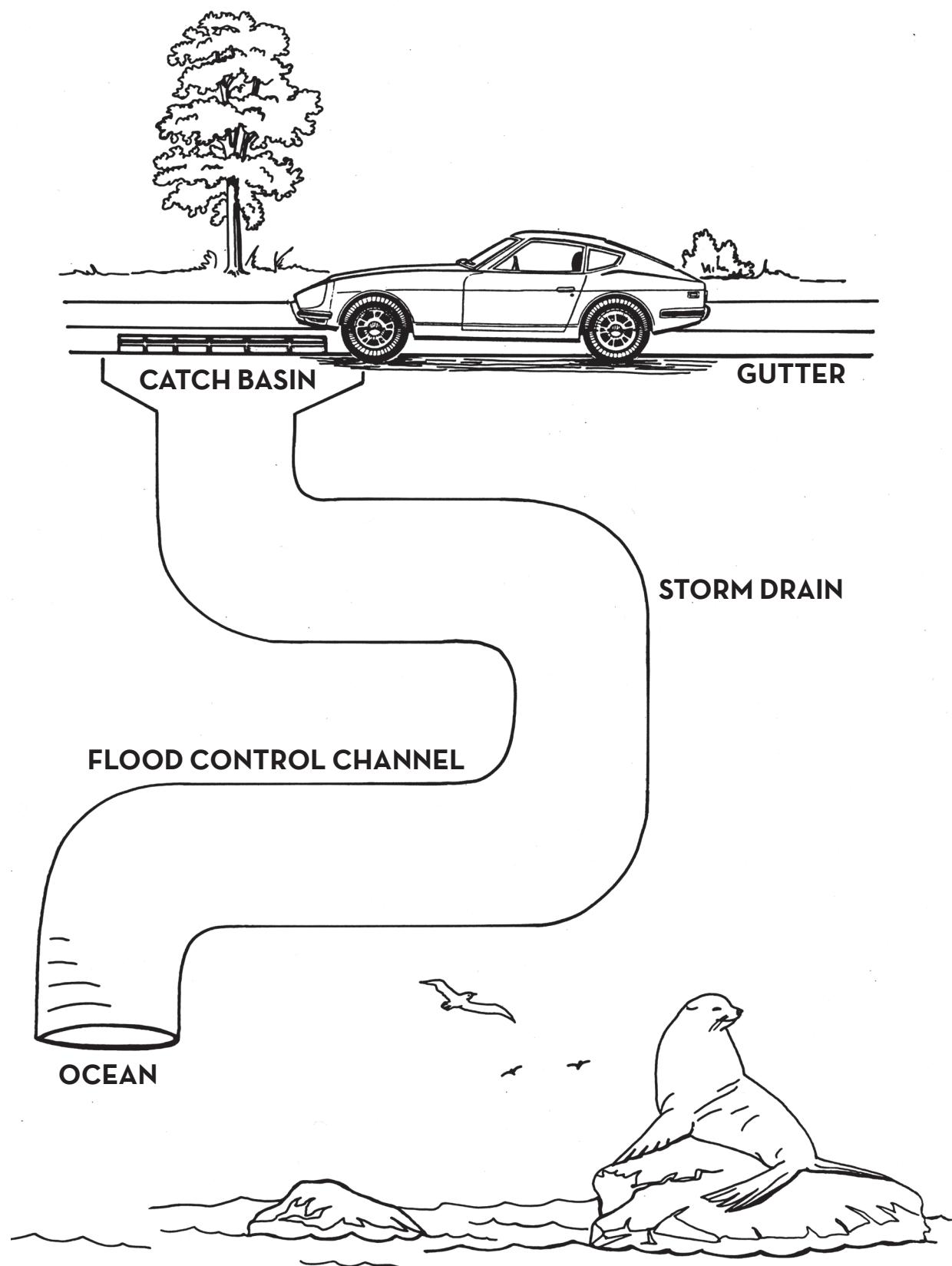


FIGURE 9: STORM DRAIN MAP





CREATURE COMFORTS

The ocean is life – a large portion of the world's oxygen is supplied by phytoplankton, the tiny green plants of the ocean. Millions of ocean creatures live in the sandy shore, rocky intertidal zone, kelp forests, and open ocean; the enormous world-wide water cycle begins and ends here.

Each day tons of polluted waste and water pour into our coastal waters affecting every aspect of ocean life. As the pollutants make their way through the food chain, people can become ill from eating contaminated fish. Trash – polystyrene, plastic, metal, paper, and more – also poses a dangerous threat to marine animals as they try to eat it or get trapped in it.

The problem starts in our own neighborhoods. Though it is hard to imagine how what we do at home, as individuals, can harm sea creatures, our actions do harm them. We must change our actions if we are to help keep oceans healthy.

PREPARATION

- Get a conch shell or other snail-like shell that has an ocean sounds when held up to the ear.
- Select the music and arrange the chairs in two rows back to back as in musical chairs.
- Write an ocean species name on an index card (figure 11). Make enough ocean species cards so that each student has one.
- Make four copies of the Environmental Events sheet (figure 10). Cut them into individual events and place them in a box for random selection.

MOTIVATOR

1. Hold the sea shell up to your ear and alert the students that you can hear the ocean! Pass around the shell for the students to hear.
2. Ask the students:
 - "How many of you have been to the ocean?"
 - "What lives in the ocean?"
 - "The ocean is home to all these different animals and fish. What do they need in order to be able to live?" (Food, water, air, shelter and space – the same as us!)



KEY CONCEPTS

- Water pollution
- Effects of pollution on ocean wildlife

MATERIALS

- Conch shell or similar
- One chair per student
- Music source
- Index cards
- Marker
- 4 copies of the Environmental Events sheet (figure 10)
- Small box or container



CREATURE COMFORTS (CONT'D)

BOOKS

- Come to the Ocean's Edge by Laurence P. Pringle
- Fabulous Fishes by Susan Stockdale
- Nobody Particular: One Woman's Fight to Save the Bay by Molly Bang
- Our Endangered Planet: Oceans by Mary Hoff

PROCEDURE

1. Hand out the ocean species cards. Have the students read what kind of animal they represent.
2. Have each student stand in front of a chair. Explain that the chairs represent the ocean that they live in. The ocean supplies them with their basic needs for survival. Face the same direction as if they were going to play musical chairs.
3. Start the music and tell the students to walk around the chairs slowly. When the music stops each student should sit down in one chair.
4. Choose one of the Environmental Event cards from the box, read it aloud, and remove a chair. Explain that because of the action on the card, their habitat has been affected.
5. Continue the game, removing one chair at each stop in the music and as the Environmental Events are selected and read. Each student eliminated from the game keeps the Environmental Event that eliminated the chair.
6. Play until there is one student left.

STRETCHING THEIR THINKING

Group students with the same Environmental Event card. In their groups have them discuss:

- “How did this event affect any of their basic needs for survival?”
- “What can people do to prevent this event from happening?”

Have groups share their answers. Have each student tell their answers as if they were the animal they represent and tell what they wish people would do to prevent harm to the ocean.

ASSESSMENT

Have students:

- Illustrate the event that caused their ocean species to be eliminated.
- Write a paragraph describing what happened to their ocean species as a result of the environmental event.

SUGGESTED INVESTIGATIONS

- Water Flow Investigation
- Smog Particle Investigation
- Waste Investigation

FIGURE 10

ENVIRONMENTAL EVENTS

Someone sprays his or her garden with poisonous pesticides. Later when watering the garden, some of the pesticides wash off. Pesticides are carried with the water down the gutter to the storm drain and then carried out to the ocean.

A factory illegally dumps left-over waste full of toxic chemicals into the ocean.

The solid matter in sewage, called sludge, is dumped into the ocean, covering the rocks at the bottom with thick goo.

After changing the oil in the car, someone dumps the used motor oil into the storm drain, where it is carried by water out to the ocean.

A popped helium balloon floats down from the sky and into the ocean.

An oil spill occurs when a large tanker full of oil tries to unload its shipment.

After a rain storm, floods of water race through the streets sending trash and litter into the storm drain where it is carried to the ocean.

Smog particles from the air settle on the ocean, making it hard for sunlight to penetrate and filter down to oxygen-making plants.

A six-pack soda ring, plastic bag and polystyrene cups are left on the ground by people having a picnic in the park. They get blown into the storm drain and carried by water out into the ocean.

FIGURE 11

OCEAN SPECIES

Brown Pelican

Sea Gull

Seal

Sea Otter

Sea Lion

Dolphin

Minke Whale

Grey Whale

Sea Turtle

Bass

Red Snapper

White Croaker

Tuna

Barracuda

Halibut

Mackerel

Flying Fish

Swordfish

Marlin

Shark

Anchovy

Hermit Crab

Crab

Abalone

Mussel

Clam

Sea Anemone

Sea Star

Squid

Jelly Fish

Sea Hare

Sea Cucumber



SOIL FACTORY SCAVENGER HUNT

Wherever you walk, down a trail or sidewalks, somewhere beneath you is soil. The surface of the earth is fertile and is a great example of recycling at its best. In a natural forest and in a functioning community forest, organic matter falls to the ground, is decomposed by moisture and billions of insects and micro-organisms.

What you see on the surface is mulch, the organic matter that has most recently fallen and will soon become humus. Mulch holds rainwater and heat, which promotes decomposition. Beneath the mulch is a layer of humus, the rich dark matter that has been broken down by worms and micro-organisms. Soil life feeds on organic matter. Without it, soil is a lifeless rock that has no way of retaining water. Rainfall pounds the soil into a hard surface, causing floods of water to run off. Mulch and healthy humus create a healthy sponge that absorbs water and has a tremendous holding power.

The cycle is complete when the roots of a tree are fed by components in the soil and the tree grows more leaves to create more organic matter.

PREPARATION

- Find an area at your school to observe leaves turning into dirt. Usually this is found under bushes, a tree, or in a planter.
- Make copies of the Soil Factory Scavenger Hunt (figure 12). Make enough copies for students to work in teams of two.
- Check the school grounds for the availability of specific items asked for on the Scavenger Hunt list. If there are no places at school, bring in a large container of soil with decomposing leaves and plant matter.
- Prepare the inside of a large glass jar with a layer of dirt.

MOTIVATOR

1. Take students outside to a part of the school or surrounding area where there is clear evidence of ground cover turning into dirt. (Leaves found under bushes or a tree.) Show them a handful of dirt with decomposing plant material.
2. Explain to students that nature doesn't make trash – nothing in nature is wasted. Ask students:
 - "What happens to all the leaves and bark when they fall off the trees?" (They are recycled with the help of insects, air, water and the sun.)



KEY CONCEPTS

- Soil cycle
- Importance of healthy soil

MATERIALS

- Large glass jar filled with several inches of healthy soil
- Copy of the Soil Factory Scavenger Hunt (figure 12)
 - 1 per group of two
- Magnifying glasses (optional)
- Pencils



SOIL FACTORY SCAVENGER HUNT (CONT'D)

BOOKS

- A Handful of Dirt
by Raymond Bial
- How We Use Soil
by Carol Ballard
- Leaves
by David Ezra Stein
- Wiggling Worms at Work
by Wendy Pfeffer

3. Explain that all of these work hard together to produce healthy soil – like a factory. “Wherever something is turning into soil, we can call it a Soil Factory.”
4. Show students the illustration and explain the cycle:
 - Dead leaves and branches fall from the tree.
 - The dead leaves and branches lay on the ground and are called mulch.
 - Water and rainfall softens the mulch, making it easier for insects, mold and micro-organisms to then eat the mulch.
 - The insects, mold, and micro-organisms break down the mulch into humus.
 - Insects, mold and micro-organisms are decomposers. Decomposers release nutrients from the leaves into the humus.
 - Humus is a dark, rich powder, and when mixed with sand and rock is called soil.
 - Healthy soil feeds the roots of plants and trees so they can grow new leaves, flowers and fruit
 - When leaves, flowers and fruit die, they fall from the tree to the ground starting the cycle again.

PROCEDURE

1. Pass out a Soil Factory Scavenger Hunt list and pencil to each pair of students.
2. Explain to the students that they are to fill out their lists and collect one item that will turn into soil.
3. Pass out magnifying glasses. Encourage the students to look closely to see that even the smallest natural item is turning into soil.
4. After the students have had a chance to discover and check off their list, gather them all together to go over the list and discuss their findings.
5. Back in the classroom, place the collected items in the glass jar with soil. Ask the students:
 - “What do you think will happen to these natural items?” (They will decompose.)
 - “What else does it need?” (Water) Add a small amount of water to the jar.
 - “Is there anything else we can add that will help with decomposition?” (sow bugs, worms, etc.)
 - “Where should we place the jar to help the soil factory work?” (Sunny location) Place the jar in the window or outdoors.
6. Observe the jar daily/weekly and record observations. Add water to keep things damp, not soggy.

STRETCHING THEIR THINKING

- “If all the leaves in an area are removed, what will happen to the soil?”
- “How are people and animals a part of the soil cycle?”
- “How is the soil cycle important to our lives?”
- “How do people affect or harm the soil cycle?”

ASSESSMENT

Have students:

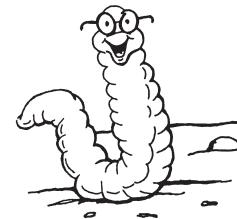
- Draw a picture of the soil cycle and label the components.
- Write a paragraph describing what they observed and how it is a part of the soil cycle.

SUGGESTED INVESTIGATION

- Soil Investigation

FIGURE 12

SOIL FACTORY SCAVENGER HUNT



1. OBSERVE THE TOP OF THE SOIL.

a. Check the things that you find that are part of the first layer of the Soil Factory – mulch:

- | | |
|---------------------------------------|------------------------------------|
| <input type="checkbox"/> leaves | <input type="checkbox"/> bark |
| <input type="checkbox"/> sticks | <input type="checkbox"/> seed pods |
| <input type="checkbox"/> other: _____ | |

2. DIG DOWN INTO THE SOIL

a. Check the decomposers that you can find:

- | | | |
|---------------------------------------|---------------------------------|-----------------------------------|
| <input type="checkbox"/> pillbug | <input type="checkbox"/> worm | <input type="checkbox"/> mold |
| <input type="checkbox"/> snail | <input type="checkbox"/> fungus | <input type="checkbox"/> mushroom |
| <input type="checkbox"/> other: _____ | | |

b. Look for signs of decomposition. Describe what you found:

c. What else did you find? Describe what you found:

d. Draw a picture of something you observed.

IS IT TRASH OR TREASURE?

A forest, in order to thrive, needs the nutrient-rich mulch (leaves, branches, pods, flowers, etc.) to fall to the forest floor and be converted into healthy humus – exactly what trees and plant life need to grow. In our city forest, most people tend to see this organic matter as trash, quickly raking, sweeping, and mowing it up and leaving it in garbage containers to be hauled off to the landfill. Some do the same, but correctly place this “green waste” in the green bin to be later composted by the City.

This green waste, or yard clippings, along with kitchen scraps can be turned into healthy soil for the garden by composting and mulching. Composting and mulching are our attempts to promote the natural process of decomposition by recycling our yard clippings, food scraps and other organic matter. A compost bin combines nitrogen-rich material, like grass clippings and food scraps, with carbon-rich material, like dray leaves and straw to make healthy humus. Chipped wood, fallen branches and leaves can be used as mulch.

Using mulch to provide a protective covering for soil and compost to feed the soil, we can divert our organic matter from landfills and convert it into healthy soil for our private and community gardens, patio, and planters.

PREPARATION

- Practice a demonstration for the students as the “Compost Gourmet” (figure 15). This can be you, a parent, or a guest speaker.
- Gather the needed props. These could include an apron, chef’s hat, large mixing bowl, smaller bowls, spoon, oven mitt, and a baking pan.
- Set up an area in the classroom, or other location, for the demonstration. Plan to place the different compost items into separate bowls separating green items and brown items.
- Put some organic compost or healthy soil in a baking pan, and hide it from view.
- Copy the picture of sample compost bins (figure 14).
- Make “Dear Parent” letters requesting compost items (figure 13).
- Prepare a classroom compost bin by taking a 5 gallon plastic container and drilling about ten $\frac{1}{2}$ inch wide holes along the bottom and sides. Put an inch of soil at the bottom.
- Decide whether the compost bin will be kept outside on a dirt surface near the classroom, or on a plate or tray in the classroom.



KEY CONCEPTS

- Elements of composting
- Benefits of composting to the soil

MATERIALS

- Large mixing bowl
- Mixing spoon
- Baking pan
- Organic compost or healthy soil (store bought, if needed)
- Copy of sample compost bins (figure 14)
- Copy of sample parent letter (figure 13)
- 5 gallon plastic container with lid
- Awl or other hole-making device

IS IT TRASH OR TREASURE? (CONT'D)

BOOKS

- Cartons, Cans and Orange Peels (Chapter 5)
by Johanna Foster
- Compost Critters
by Bianca Lavies
- Compost Stew
by Mary McKenna

MOTIVATOR

1. Say to the students:
 - “Tomorrow we are having a special demonstration by the Compost Gourmet. The Compost Gourmet specializes in turning natural trash into treasure!”
2. Make a list on the board as you ask the students:
 - “What is ‘natural’ trash?” (Grass clippings, leaves, food scraps)
3. Pass out the Parent Letter to each student and explain the request for each of them to bring in one of the items listed in the letter.

PROCEDURE

1. Using the various items brought in by the students, set them up at the demonstration table. Separate them by “greens” (high in nitrogen – food scraps, fresh grass, coffee grounds, etc.) and by “browns” (high in carbon – dry leaves, pine needles, wood chips, paper scraps, etc.).
2. Put on the apron and proceed with the demonstration using the Compost Gourmet Script as your guideline. Invite students to help in the process.
3. After the demonstration, pour the mixture into the classroom compost bin. Add more ingredients if necessary, including shredded paper from the classroom.
4. Observe the compost bin regularly and record observations.
5. Add the composted soil to a garden, planter, or base of a tree at the school.

STRETCHING THEIR THINKING

- “What can we do with the healthy soil that we get from composting?”
- “Some people use a hose to clean their sidewalks and spray garden clippings into the street. What can they do instead?”
- “How does composting help the soil cycle in a city forest?”
- “What is the difference between mulching (like the Dirt Doctor) and composting (like the Compost Gourmet)?”

ASSESSMENT

Have students:

- Draw a picture of “green” items and “brown” items that can go into a compost bin.
- Write a paragraph or “script” for the Compost Gourmet.

SUGGESTED INVESTIGATIONS

- Soil Investigation
- Waste Investigation

FIGURE 13

SAMPLE PARENT LETTER

Dear Parent:

Tomorrow we are learning about soil. Please have your child bring in a sandwich bag filled with one of the following items from your kitchen, patio or garden:

- Food scraps: fruit rinds or vegetable trimmings (no meat or cheese)
- Coffee grounds
- Grass clippings
- Dry leaves
- Pine needles
- Wood chips
- Plant trimmings

Thank you!

FIGURE 14

SAMPLE COMPOSTING BINS

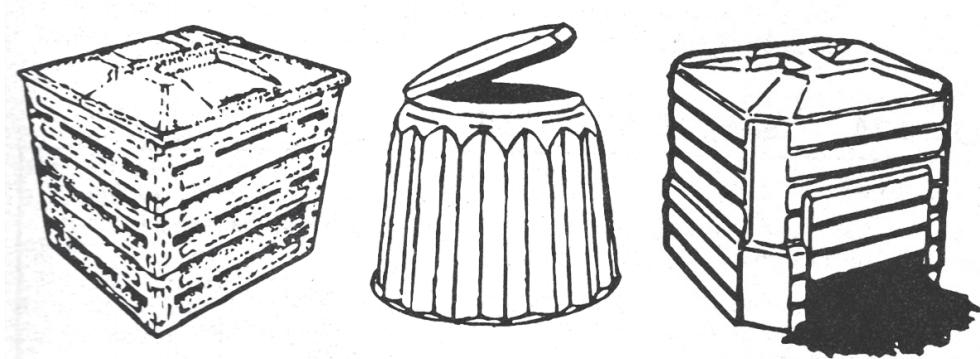
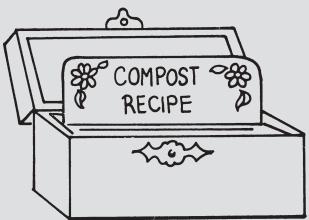


FIGURE 15



COMPOST GOURMET SCRIPT

Welcome everyone! I am the Compost Gourmet! Today I am going to show you how to turn what some people think is trash, into treasure.

Thank you for bringing in all these lovely ingredients! Look what we have here (hold up some of the bowl garden clippings and food scraps). These yard clippings and food scraps are usually considered trash. What do we usually do with trash? (Throw it away) Not in my kitchen! We do not have to throw any of this away. All of these things are made by nature, so they can be turned into a treasure, or what I call compost. Compost is a rich soil that can be used to grow food, flowers and plants. Instead of going into the trash, it goes into the garden!

We are going to mix together all of these items – like a cook. That is why I am the Compost Gourmet! Using a special recipe, I will mix these together to make compost.

The perfect recipe calls for an equal mix of nitrogen and carbon. These are important ingredients for making healthy soil. For our recipe we will call nitrogen-rich ingredients, "greens." The green ingredients are usually moist, like grass clippings, food scraps, coffee grounds, and garden trimmings. (Hold up examples.) We will call carbon-rich ingredients, "browns." The brown ingredients are usually dry, like straw, dry leaves and branches, pine needles and wood chips. (Hold up examples.)

Let's start with some greens. (Invite students to come up and add different green ingredients to the large mixing bowl.) Next, we will add some browns. (Invite students to come up and add different brown ingredients to the large mixing bowl.) Now, we need to add some water. (Invite a student to add water to the large mixing bowl.) Lastly, we mix it all together. (Invite students to mix the ingredients together.)

Now that we have our mixture all ready, we need to put it in the oven. Do you think we should put it in a kitchen oven? The ingredients for compost go into a compost bin. (Show the sample pictures of compost bins.) A compost bin works like an oven. Microorganisms – tiny animals, bacteria, and fungi that are too tiny to see – and worms work so hard to chew up this mixture, that the compost bin actually gets hot inside. In about 2 – 3 months we will have our finished product – healthy compost for the soil! Since we don't have a large compost bin at school, I have made a smaller one for our classroom. (Pour the mixture into the small compost bin.)

In the interest of time, here is a sample! (Using an oven mitt, bring out a prepared pan with compost/healthy soil.)

Smell it and feel it. (Pass the pan around for students to smell and feel.) What can we do with this healthy compost? (Invite students to feed handfuls to a school garden planter, or tree.)



KEY CONCEPTS

- Air cycle
- Importance of healthy air

MATERIALS

- Containers of bubbles
- Large, clear cup
- Straw
- Large balloon
- Small blue balloons – 5 per group of 3 students
- Small green balloons – 5 per group of 3 students
- Buckets or paper bags – 2 per group of 3 students
- Masking tape
- Copy of Human Lung Diagram (figure 17)

PREPARATION

- Prepare for the air activities with containers of soap bubbles, a clear glass of water with a straw for blowing, and a balloon. You may choose to have only one set for demonstration, or several sets for students to share.
- Prepare an area outside to play the Air Cycle Relay. Spread the players out far enough for teams to run with the balloons. Use figure 16 as a guide and mark the player's spot with masking tape.
- Plan to divide students into teams of three for the relay.
- Fill small balloons with either water or air. Blue balloons represent oxygen and the green balloons represent carbon dioxide. Place five blue balloons in one bag and five green balloons in another bag for each team of three students.
- Make a copy of the Human Lung Diagram (figure 17) for the demonstration.

MOTIVATOR

1. Blow bubbles into the air and explain to the students that air is invisible but by blowing bubbles we are able to show that it is there – blowing air into the soap traps it in a bubble.
2. Invite students to trap air in bubbles.

AIR APPARENT (CONT'D)

BOOKS

- Air is Everywhere
by Melissa Stewart
- Air: Outside, Inside and All Around
by Darlene R. Stille
- Our Endangered Planet: Air
by Lisa Yount and Mary M. Rodgers

PROCEDURE

1. Using large, clear cups of water, invite students to blow air into the water. Air causes the water to move and bubble.
2. Invite students to blow air into the balloons. Air is trapped inside and causes the balloon to expand.
3. Invite students to stand up and twirl around with their arms out. Or, make paper fans. Explain to the students that we feel air when we move or when the air moves as wind.
4. Explain to the students that air is everywhere. It covers the earth like a blanket and is called atmosphere. The atmosphere is made up of different gases. The most important gas they need is called oxygen. Invite students to take in a deep breath, and then let it out. Have them feel their chest move in and out. Explain that the oxygen goes into their lungs, and travels to all the cells in their body. They need oxygen to live. When they breathe out, they get rid of a gas called carbon dioxide.
5. Take students outside to a tree or bush. Ask the students:
 - “Where do people get the oxygen that they need to breathe?”
 - “Where do plants get the carbon dioxide that they need to live?”
6. Explain to the students that to demonstrate the exchange between people and plants they will do a relay.
7. Divide the class into groups of three. Assign each person in the group to be either a plant (takes in carbon dioxide and gives off oxygen), person (takes in oxygen and breathes out carbon dioxide,) or air (a mixture of gases). Arrange the groups following figure 16.
8. Give each of the “people” players a bag with 5 green CARBON DIOXIDE balloons. Give the “plant” players a bag with 5 blue OXYGEN balloons.
9. Have each group act out the air cycle, running back and forth, until all the balloons have switched sides. To begin:
 - The “people” player runs to deliver a green carbon dioxide balloon to the “air” player.
 - The “air” player runs to deliver the green carbon dioxide balloon to the “plant” player before returning to the middle.
 - The “plant” player runs to deliver a blue oxygen balloon to the “air” player.
 - The “air” player runs to deliver the blue oxygen balloon to the “people” player before returning to the middle.
 - The cycle begins again.
10. Teams can act out the air cycle as a relay race.

STRETCHING THEIR THINKING

Show the students the Human Lung Diagram

- “What do we use in our body to breathe?”
- “Where do plants get the carbon dioxide that they need to live?”
- “Where do we get the oxygen that we need?”
- “Why is important to have healthy air?”

Flip over the Human Lung Diagram to reveal that our lungs – upside down – look like a tree. We are cycle partners!

ASSESSMENT

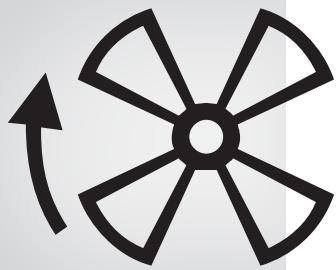
Have students:

- Draw a picture of the air cycle and label the components.
- Write a paragraph describing their role in the air cycle relay and the importance to the cycle.

SUGGESTED INVESTIGATIONS

- Air Temperature Investigation
- Smog Particle Investigation
- Tree Care Investigation

FIGURE 16



AIR CYCLE RELAY SET-UP

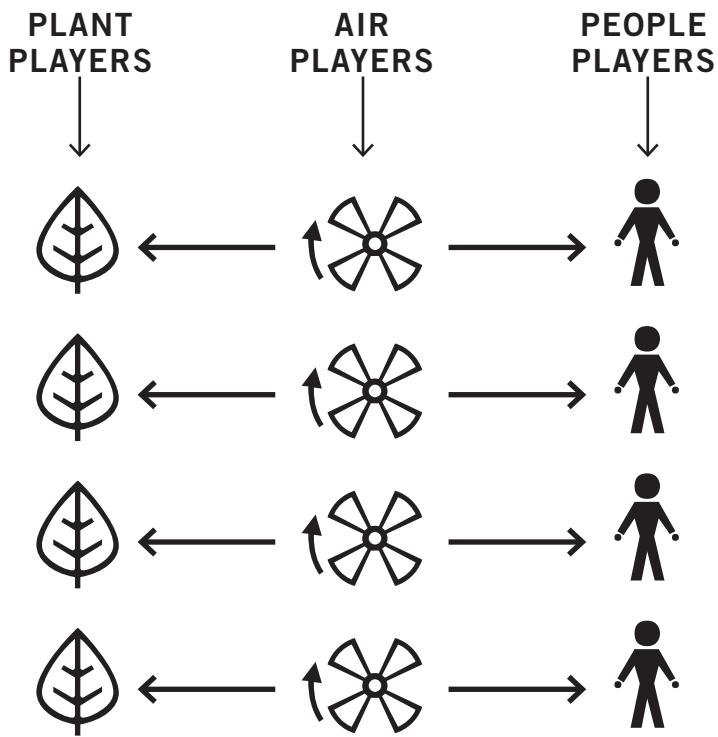
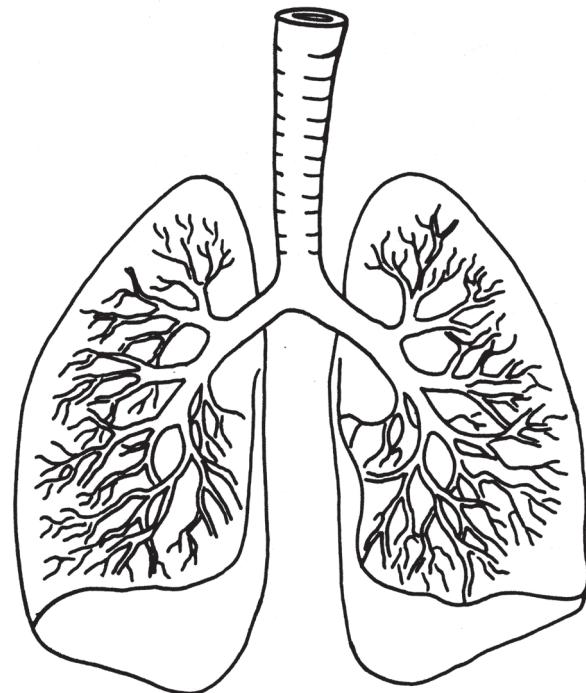


FIGURE 17

HUMAN LUNG DIAGRAM



AN ISLAND OF HEAT

Looking across the city forest one tends to see more concrete and asphalt, than trees and greenery. This very sight causes the temperatures in our city to be higher due to heat absorbing surfaces, such as black-top playgrounds, parking lots, streets and buildings. When heat is absorbed and then released back into the surrounding area, we have a temperature phenomenon known as the urban heat island effect. This effect makes Los Angeles into an island of heat. Increased heat raises temperatures and increases the demand for air conditioning in the summer. This not only leads to higher energy bills, but increases greenhouse gas emissions from power plants that provide that extra energy.

Trees and other plants help cool the environment, making vegetation a simple and effective way to reduce urban heat islands. Trees and vegetation lower surface and air temperatures by providing shade and when planted in strategic locations around buildings or to shade pavement in parking lots and on streets we not only have cooler temperatures, lower heat absorption, but a more green and beautiful city.

PREPARATION

- Find a hot, black-covered surface, such as the playground, and a grass or tree-covered area, to take the students.
- Decide whether you will do the experiment as a demonstration or in student groups.
- Record the temperature results as in figure 18.

MOTIVATOR

1. Take the students outside, on a sunny day, to a hot part of the playground. Ask the students:
 - “How do you feel?”
 - “How does your body feel?”
 - “What is the effect on your eyes?”
 - “Why do you think it is so hot here?”
2. Ask students to point out all the different places around the school that are hot and sunny.



KEY CONCEPTS

- Heat island effect
- Energy conservation

MATERIALS

- Identical jars filled with cold water – 1 per group
- Sheet of black construction paper – 1 per group
- Sheet of aluminum foil – 1 per group
- Thermometers – 2 per group
- Tape
- Sun lamp



AN ISLAND OF HEAT (CONT'D)

BOOKS

- Why Should I Save Energy?
by Jen Green

3. Take the students to a cooler part of the school – on grass or under trees. Ask the students:
 - “How do you feel?”
 - “How does your body feel?”
 - “What is the effect on your eyes?”
 - “Why do you think it is cooler here?”

PROCEDURE

1. Explain to students that they are going to find out why it is so hot on the playground compared to other places around the school.
2. Either working in student groups or as a demonstration, do the following:
 - Fill two jars with equal amounts of cold water.
 - Tape a tube of black construction paper around the outside of one of the jars.
 - Tape a tube of aluminum foil around the outside of the other jar
 - Insert one thermometer into each jar.
 - Record the temperature of each jar.
3. Place both jars at an equal distance, but close, to a strong light source for an hour.
4. After one hour, re-check and record the temperatures. After another hour, re-check and record the temperatures.
5. Have students share their results and compare the difference between the black-covered jar and the aluminum-covered jar.
6. Ask the students:
 - “Why do you think the jars of water covered in black were a higher temperature?”
 - “Why do you think the jars of water covered in aluminum foil were a lower temperature?”
7. Explain to the students that dark surfaces absorb more heat than light surfaces. In the black jar, heat moved to the water. The heat energy that hit the lighter-colored aluminum foil reflected the heat, and did not affect the water's temperature. This absorption of heat by the dark color that is then released into the surrounding area is called “heat island effect.” Heat-absorbing buildings and surfaces from sunlight, release the absorbed heat back into the surrounding air. This increases the outdoor air temperature by 6 to 8 degrees Fahrenheit in a specific area, or “island.” Lighter, reflective colors, like the aluminum foil reflect the heat away rather than absorbing it.

STRETCHING THEIR THINKING

- “What surfaces in our city forest are dark?” (Roof tops, playgrounds, streets, parking lots, etc.)
- “How does the dark surfaces at the school, affect the surrounding air temperature?”
- “How does the raise in air temperature at our school affect the use of air conditioners?”
- “How do trees and other vegetation reduce heat island effect?”
- “What can be done to lower the heat island effect at the school?”

ASSESSMENT

Have students:

- Illustrate the heat island effect.
- Write a paragraph about how color affects heat.

SUGGESTED INVESTIGATIONS

- Air Temperature Investigation
- Schoolyard Tree Site Investigation
- Tree Care Investigation

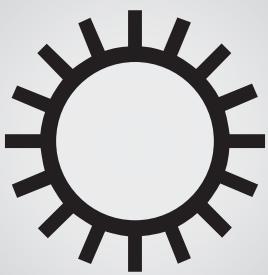
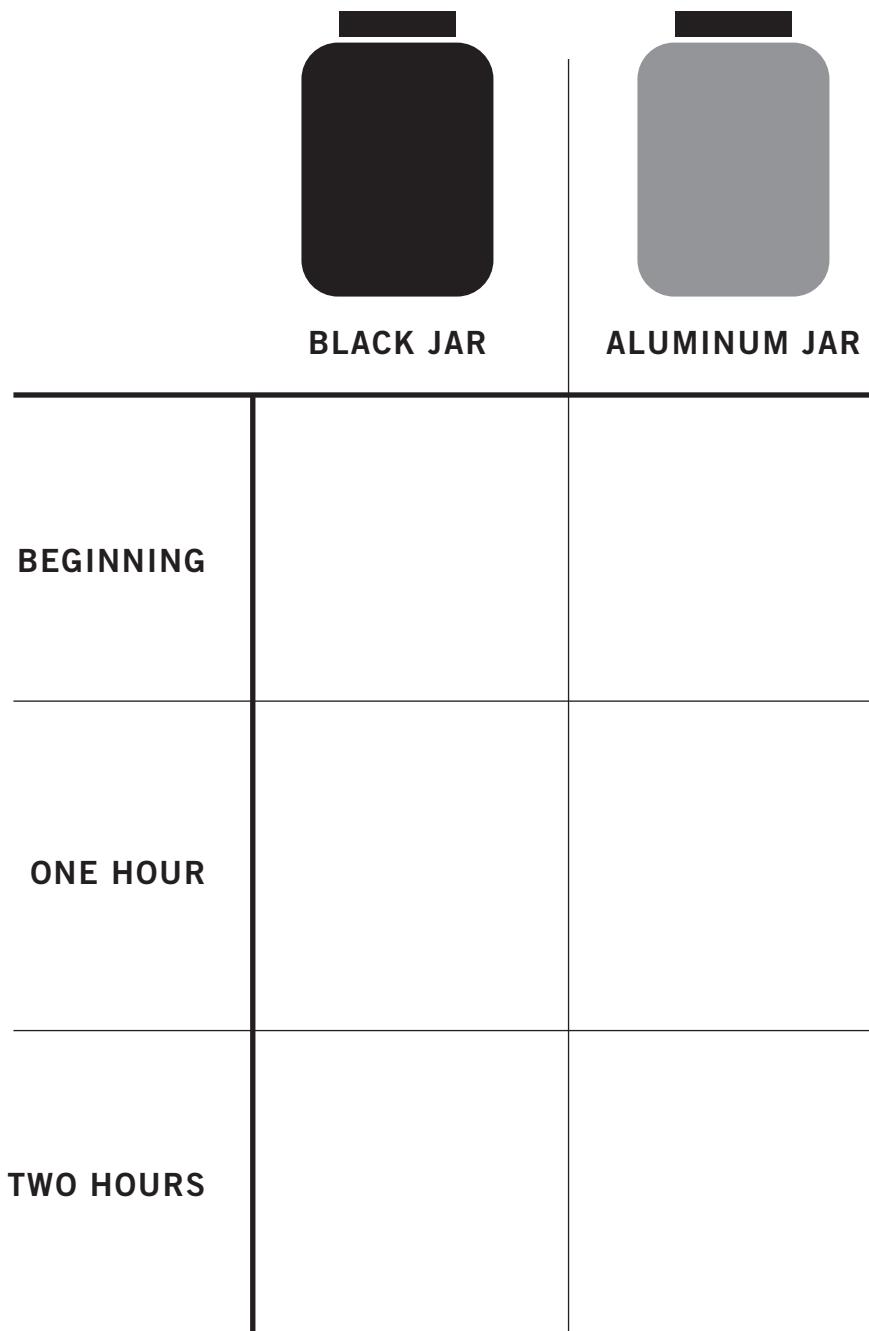


FIGURE 18

TEMPERATURE RESULTS



TREE BUDDIES

Trees contribute a lot to our lives, physically, aesthetically, emotionally and spiritually. Trees in our city forest shade and cool our streets and buildings, creating beautiful green towers to soften the harsh urban environment. A big tree can provide a day's oxygen for up to four people. Trees contribute to a community's sense of place. They increase property value. They provide fruit. They give us beautiful shapes, flowers, fall colors and scents, and they provide homes for birds, butterflies, squirrels and other wildlife. Their flowers are a food source for bees. In colder climates, trees can help insulate homes from cold winds as well. Trees catch rainfall, slow storm water run-off, and prevent soil erosion.

Not so obvious are the emotional and healing benefits to people, as well as the inspiration and sense of spiritual renewal that trees provide. Children are naturally drawn to trees. A tree provides a myriad of sensory experiences for the child, and a tree soon becomes a good friend!

PREPARATION

- Prepare a container with tree-related products. See sidebar on page 52 for ideas.
- Plan to use a tree, or group of trees as "buddies" for the activity. If there are no trees on the school grounds, try to bring in a potted tree.
- Decide whether students will work individually, in pairs, or as one group.
- Make copies of the Tree Buddy Profile.

MOTIVATOR

1. With a container of tree-related products, explain to the students that they are going to meet a special buddy today, as you share the different items.
2. As you hold up the different items, share with the group that "This buddy is special because it..."
 - Gives us air. (Breathe in and out.)
 - Gives us food.
 - Gives us wood.
 - Gives us rubber.
 - Gives us paper.
 - Gives us a home for animals.
 - Gives us beauty and color.



KEY CONCEPTS

- Importance of trees

MATERIALS

- Basket or other container
- Various tree-related objects (see sidebar on page 52)
- Tree Buddy Profile (figure 19) - 1 per student or group



TREE BUDDIES (CONT'D)

BOOKS

- Are Trees Alive?
by Debbie S. Miller
- Have You Seen Trees?
by Joanne Oppenheim
- Nature in the Neighborhood
by Gordon Morrison
- Someday a Tree
by Eve Bunting

SAMPLE TREE BUDDY ITEMS

- Fruit
- Nest
- Wooden spoon
- Maple syrup
- Rubber band or gloves
- Colorful leaf or flower
- Paper
- Small umbrella (shade)
- Cough drops
- Chewing gum
- Cinnamon
- Cork

PROCEDURE

1. Take the students out to a tree, or group of trees, on the schoolyard.
2. Either working individually, in groups, or as a class, have students observe the tree and answer the questions on a Tree Buddy Profile.
3. Pass out the Tree Buddy Profile sheets and colored pencils or crayons for the students to use. Explain that they can observe the tree without pulling on branches or picking off the leaves.
4. Before going back to the classroom, go over the student's Profile answers.

STRETCHING THEIR THINKING

- "How did the tree keep the area from being too hot?"
- "Who uses the tree as home?"
- "How did the tree capture pollution from cars, trucks or busses?"
- "How did the tree make the area more beautiful?"
- "How does the tree help the water cycle?"
- "How does the tree help the soil cycle?"
- "How does the tree help the air cycle?"
- "Can our school benefit from more trees?"

ASSESSMENT

Have students:

- Draw a picture of a tree and include at least one benefit it provides.
- Write a paragraph or a poem describing their Tree Buddy and the benefits it provides the school.

SUGGESTED INVESTIGATIONS

- Air Temperature Investigation
- Smog Particle Investigation
- Schoolyard Tree Site Investigation
- Tree Care Investigation

FIGURE 19

TREE BUDDY PROFILE

Name: _____ Date: _____

1. WHEN I SIT UNDER MY TREE BUDDY I FEEL:

- hotter
- cooler
- no change

Why? _____



2. WHAT ANIMALS AND INSECTS LIVE IN MY TREE BUDDY?

- birds ants
- squirrels spiders
- other: _____

3. WHEN I RUN MY FINGER ALONG A LEAF IT IS:

- clean
- dirty

4. COLORS I SEE ON MY TREE BUDDY:

5. ADJECTIVES THAT DESCRIBE MY TREE BUDDY:







KEY CONCEPTS

- Similarities between trees and humans
- Need to care for trees

MATERIALS

- Mural paper – 1 student-length per student
- Crayons

PREPARATION

- Cut lengths of mural paper to fit each student.
- Practice saying the visualization. Feel free to create your own, or modify or use the one provided.
- Plan to do the visualization either in the classroom or have students sit under a tree.

MOTIVATOR

1. Take students out to their Tree Buddy or another tree or group of trees. Explain to students that they will sit quietly with their eyes closed as you help them to imagine what it is like to be a tree.
2. Speaking softly and slowly, read the visualization.

Imagine yourself walking down a path in a park... You feel the warmth of the sun on your body... Suddenly you feel your toes tingle as they start to grow and push out of your shoes and down into the ground... You feel them digging deep into the warmth of the soil... You can't move... Your hair starts to change into leaves – big colorful leaves of green and yellow... Your fingers begin to sprout leaves too as you notice your arms turning hard, stiff and scaly, and branching up and out... Now your body is changing... It becomes a strong and straight trunk covered with bark... You have become a tree!

As a tree, you can feel the wind gently blowing through your branches and rustling your leaves... Just when you feel thirsty, water soaks into your roots and slowly pushes up through your trunk, and through each branch to feed your leaves... You feel the air come into your leaves as you take a breath of carbon dioxide, and breathe out oxygen... Mmm, you are hungry, so you grab rays of sunlight to make food... Your leaves use part of the water and part of the air to make food, and slowly you pump it down into your branches and trunk and throughout your whole body...

THE TREE IS LIKE ME! (CONT'D)

BOOKS

- Are Trees Alive?
by Debbie S. Miller
- Look Inside a Tree
by Gina Ingoglia

What else do you feel? Birds landing on your branches... Squirrels running down your trunk... The rain falling onto your leaves and dripping down your branches to your trunk and seeping into the earth to feed your roots... What kind of tree are you? Do you grow fruit for birds, animals and people to eat? Are you tall and reach into the clouds? Do you have wide, spreading branches that provide a canopy of shade? Do you have flowers?

Now, slowly bring yourself back...

PROCEDURE

1. Invites students to open their eyes and share their experiences.
2. Back in the classroom, have students take turns lying down on a sheet of mural paper. Trace around their bodies, creating individual life-size images.
3. Have students draw in their face.
4. Have students draw on their own image the likeness of a tree:
 - Body – trunk
 - Hair/Fingers – Leaves
 - Hands/Arms – Branches
 - Feet/Toes – Roots
 - Skin – Bark
5. Invite the students to add other features such as draw in animals and birds or collect fallen leaves to glue onto their branches.

STRETCHING THEIR THINKING

- “What else do people have in common with trees?”
- “What do trees need in order to live and grow?”
- “What do people need in order to live and grow?”
- “What is an idea you have for helping the trees at our school?”

ASSESSMENT

Have students:

- Categorize the ways trees are similar to people using “Tree” and “Me.”
- Write a paragraph describing what it felt like to pretend to be tree.

SUGGESTED INVESTIGATION

- Tree Care Investigation



KEY CONCEPTS

- Natural Resources used to make everyday products
- Benefits of reducing, reusing, and recycling

MATERIALS

- A box filled with a plastic bottle, aluminum can, glass bottle, and newspaper
- Variety of classroom and household items (see sidebar on page 58)

PREPARATION

- Prepare a treasure box, or other special looking box with a plastic bottle, aluminum can, glass bottle and some newspaper. Attach labels that read: Treasure of the Forest (paper), Treasure of the Beaches/Desert (glass), Treasure of the Mountains (can), and Treasure of the Pre-Dinosaurs/Oil (plastic).
- Prepare the following note to include inside the treasure box:
Inside this box are nature's treasures in disguise. They are treasures because they are made from valuable resources of the earth. They are in disguise because their appearance has changed! A lot of people don't know that these are treasures, so they throw them into the trash. See if you can figure out why these items are treasures.
- Gather about 20 items (see sidebar on page 58) and number them.
- Plan to have students work in groups. They will need a sheet of paper numbered from 1 to 20.

MOTIVATOR

1. Show the students the treasure box. Ask them if they would like to know what is inside.
2. Read the enclosed letter before holding up each of the items and asking:
 - "Why is this the Treasure of the Forest?" (Paper – because it is made from trees.)
 - "Why is this the Treasure of the Beaches/Deserts?" (Glass – because it is made from sand.)
 - "Why is this the Treasure of the Mountains?" (Can – because it is made from minerals that are dug out from mountains.)

BOOKS

- Re-cycles
by Michael Elsohn Ross
- Recycle Every Day!
by Nancy Elizabeth Wallace
- Something Old,
Something New: Recycling
by Anita Ganeri

SAMPLE TREASURE ITEMS

- Paper clip
- Soup can
- Scissors
- Kitchen Utensil
- Ruler
- Pencil
- Clothes pin
- Toilet paper roll
- Cereal box
- Writing paper
- Glass bottle
- Drinking glass
- Peanut butter jar
- Comb
- Toothbrush
- Plastic grocery bag
- Six-pack soda ring
- Plastic milk bottle

TREASURES IN DISGUISE (CONT'D)

- "Why is this the Treasure of the Pre-Dinosaurs/Oil?" (Plastic – because it is made oil that is from ancient plant material.)

PROCEDURE

1. Arrange students into working groups.
2. Explain to the groups that you will pass around 20 numbered items and that they are to determine and record which natural treasures they came from – forest, mountain, beach/desert, or oil.
3. Pass out the different items. Circulate them among the groups.
4. When finished, have the groups share their answers.
5. Discuss with the students how reducing, reusing, and recycling helps our natural resources:
 - Reducing resources means limiting the number of items you purchase. When you limit what you buy, less is thrown away, so resources are saved.
 - Reusing resources means using items as much as possible before replacing them. When items are used over and over again, less is thrown away, so resources are saved.
 - Recycling resources means using items again in another form. When used items are processed into new items, less is thrown away, so resources are saved.

STRETCHING THEIR THINKING

- "What can we do to help the Treasure of the Forest?"
- "What can we do to help the Treasure of the Beaches/deserts?"
- "What can we do to help the Treasure of the Mountains?"
- "What can we do to help the Treasure of the Pre-Dinosaur/Oil?"

ASSESSMENT

Have students:

- Bring in something from home that is a treasure in disguise and explain why.
- Write a paragraph about one treasure in disguise and how to prevent it from being wasted.

SUGGESTED INVESTIGATIONS

- Water Flow Investigation
- Waste Investigation
- Classroom Eco-investigation

SCHOOLYARD INVESTIGATIONS



WATER FLOW INVESTIGATION

MAPPING WHERE WATER FLOWS ACROSS THE SCHOOLYARD

PREPARATION

- Decide if you will conduct the investigation as one group or in student groups.
- Obtain a map of the schoolyard. If one is not available, a simple, hand-drawn map can be created. Enlarge areas of the map for different student groups identifying their investigation area.
- Walk around the school ahead of time to get an idea of areas to investigate. Look for examples of items they are to look for, and explain what they are, such as gutters, down spouts, drains, etc.

PROCEDURE

1. Instruct students on how to use the Water Flow Investigation worksheet, using the different colored markers to identify what is found.
2. As a group, or in separate student groups, go to the different areas of the schoolyard to look for where water flows.
3. Back in the classroom, have student groups share their findings
4. On their maps, have students circle trouble spots:
 - Trash and other harmful things.
 - Areas that flood.
 - Areas where water travels over car oil and other harmful things left on the ground.
 - Areas where water flows into the street or down a drain instead of into the ground.
5. Ask the students:
 - “Where does water flow into grass and gardens?”
 - “What are sources of water at our school?”
 - “What is the path water takes from sources of water to drains, gutters, and the street?”
 - “What did you find that could be harmful to water as it flows across the schoolyard?”
 - “What did you learn about water flow at the school?”
 - “What can we do to help the water at our school?”

MATERIALS

- Map of schoolyard – 1 per group
- Colored markers (green, blue, purple, red) – 1 set per group
- Water Flow Investigation worksheet (figure 20)

RELATED CLASSROOM ACTIVITIES

- Waterdrop's Journey
- Water Destination Relay
- Creature Comforts
- Treasures in Disguise

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Work with school facility managers, PTA or site council members to plant a rain garden on your campus where water floods, or to prevent water from flowing into storm drains.

FIGURE 20

WATER FLOW INVESTIGATION



Name: _____ Date: _____

Location of Investigation: _____

1. Use **colored markers** to mark your map and identify what is found.
2. Walk around the entire area looking for the items listed below, and marking their locations on the map.

LOOK FOR...

- Places where water can get into the ground (grass, dirt, garden, etc.). Use **green** to show these places on your map.
- Sources of water (faucet, drinking fountain, sprinkler, hose, etc.). Use **blue** to show these places on your map.
- Places where water travels (gutters, down spout, drain, concrete, asphalt, etc.). Use **purple** to show these places on your map.
- Trash and other things that could be harmful to water (food trash, candy wrappers, motor oil, etc.). Use a **red X** to show these items on your map.



SOIL INVESTIGATION

TESTING SOIL COMPACTION AND PERCOLATION AROUND THE SCHOOL

PREPARATION

- Plan out locations on the schoolyard to conduct the investigation.
- Decide whether you will conduct the investigation as one group or in student groups.
- Print out copies of the Schoolyard Soil Study worksheets.

PROCEDURE

1. Recall with students what they learned from TreePeople's Dirt Doctor. Explain that healthy soil with mulch is loose and full of broken-down leaves and branches. This allows water and air to soak into the soil, making it healthy and like a sponge. However, when we take away leaves and branches, the soil is left exposed and dries out. When this happens, water from rain pounds down the soil, causing it to be compacted. When soil is compacted there is no room for air or water. No leaves break down to provide nutrients to the soil. Water flows across the soil instead of seeping down into it.
2. Ask the students:
 - “Why is it important that we keep water from flowing off our schoolyard?”
 - “Why is it important to have healthy, mulched soil?”
3. Explain to the students that they will explore and map soil health (compaction and percolation) on their schoolyard.
 - Compaction describes how tightly the spaces in the soil are packed together. Soils that are highly compacted have fewer spaces for air, water, and living things.
 - Percolation describes the movement of water through the soil. Percolation is another measure of the amount of compaction of your soil. The faster the water runs through the soil, the less compacted the soil is.
4. Take the students out into the schoolyard. Point out and explain the following:
 - Soil areas for testing.
 - Use of a pencil as a compaction rod.
 - How to test percolation rate.
 - How to measure the results on the Schoolyard Soil Survey worksheet.

MATERIALS

- Schoolyard Soil Study worksheet (figure 21) – 1 per group
- New, sharpened pencil – 2 per group
- Metric ruler – 1 per group
- Water – 1 container per group
- Watch or timer – 1 per group
- Trowel – 1 per group

SOIL INVESTIGATION (CONT'D)

5. Break students up into working groups. Give each team their assigned location, a copy of the Schoolyard Soil Survey worksheet and the materials that they need.
6. Have groups go out to their assigned area and conduct the soil survey.
7. Back in the classroom, have each group share their results. Record the results on the board.
8. Using the results of each area, have students determine which areas need soil improvement.
9. Ask the students:
 - “Was the soil hard and compacted or soft and loose?”
 - “Did the water soak in quickly or slowly?”
 - “What did you learn about the soil at the school?”
 - “What can we do to help the soil at our school?”

RELATED CLASSROOM ACTIVITIES

- Water Destination Relay
- Soil Factory Scavenger Hunt
- Is it Trash or Treasure?

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Maintain a 3-inch layer of mulch on soil surfaces throughout the school to prevent runoff and increase soil health. Monitor the results of your work.

FIGURE 21

SCHOOLYARD SOIL STUDY

Name: _____ Date: _____

1. DESCRIBE WHERE YOUR SOIL TEST AREA IS LOCATED AT THE SCHOOL

- Bare ground Under a bush Dry Moist

2. DESCRIBE THE SOIL IN YOUR TEST AREA

- a. Take one of the pencils, sharp end down, and push it straight into the ground slowly using steady force with the palm of your hand, until it doesn't go any deeper.
- b. Using the other pencil, make a mark on the first pencil at soil level.
- c. Pull the pencil out of the soil. Using the ruler, measure the distance from the mark you made to the end of the pencil point.

Compaction Reading _____ cm

4. MEASURE THE SOIL PERCOLATION RATE IN YOUR TEST AREA

- a. Using the trowel, dig a hole about 6" wide and as deep as the blade of the trowel.
- b. Fill the hole with water and note the time.
- c. Measure the height of the water using a metric ruler.
- d. Measure the level every 10 minutes for 30 minutes.

Reading #	Time	Level of water
1	start	_____ cm
2	after 10 min.	_____ cm
3	after 20 min.	_____ cm
4	after 30 min.	_____ cm



AIR TEMPERATURE INVESTIGATION

MAPPING AIR TEMPERATURE AROUND THE SCHOOL

PREPARATION

- Plan out locations on the schoolyard to conduct the investigation.
- Decide whether you will conduct the investigation as one group or in student groups.
- Print out copies of the Schoolyard Air Temperature Study worksheets.
- Plan to conduct the investigation on a sunny day, for best results.

PROCEDURE

1. Explain to the students that they will explore and map air health temperature on their schoolyard.
2. Take the students out into the schoolyard. Point out and explain the following:
 - Areas for testing.
 - Use of a thermometer.
 - How to test measure air temperature.
 - How to record the results on the Schoolyard Air Temperature Study worksheet.
3. Break students up into working groups. Give each team their assigned location, a copy of the Schoolyard Air Study worksheet and the materials that they need.
4. Have groups go out to their assigned area and conduct the air study.
5. Back in the classroom, have each group use the bar graph on the worksheet to show their results.
6. Have each group share their results.
7. Using the temperature results for the hottest place in each student area, have students graph the class results on their worksheet to reveal which areas are the hottest at their school.
8. Using the results of each area, have students determine where at the school, needs cooling.
9. Ask the students:
 - “At school, are there more areas that are hot or areas that are cool?”
 - “What did you learn about air temperature at the school?”
 - “How does cooler air temperatures help the school?”
 - “What can we do to help lower air temperature at our school?”

MATERIALS

- Map of schoolyard – 1 per group
- Schoolyard Air Temperature Study worksheet (figure 22) – 1 per group
- Colored markers (blue, red) – 1 set per group
- Thermometers – 1 per group

RELATED CLASSROOM ACTIVITIES

- Air Apparent
- An Island of Heat
- Tree Buddies

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Work with school facility managers, PTA or site council members to plant a tree in an area that needs to be shaded including the south-side of a building, air conditioning unit or places where children gather.

FIGURE 22

SCHOOLYARD AIR TEMPERATURE STUDY



Name: _____ Date: _____

A. IDENTIFY TESTING LOCATIONS IN YOUR AREA AND TAKE AIR TEMPERATURE

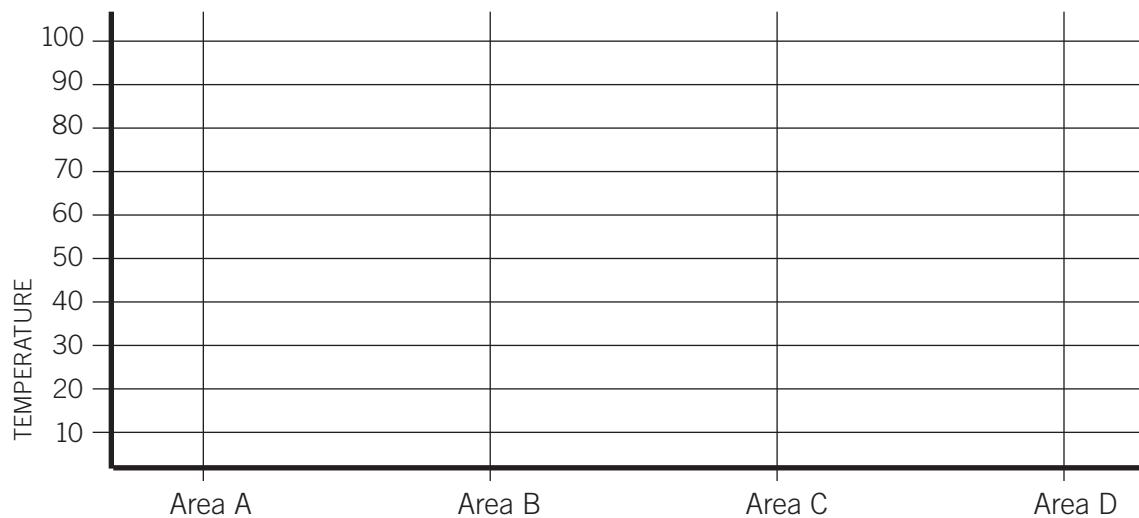
1. Draw in any air conditioning units on your map. If any are in a sunny location, plan to use this area as one of your testing spots.
2. Choose two areas that seem to be the coolest and two areas that seem to be the hottest. Remember, areas under shade are coolest and areas that absorb and reflect heat such as concrete and asphalt are the hottest. Identify these areas on your map, labeling them areas A, B, C and D.
3. Take air temperature in all four locations.
 - a. At shoulder height, hold the thermometer over the center of the area you are measuring.
 - b. Be sure to hold the thermometer in a way that measures air temperature and not hand temperature.
 - c. Wait at least three minutes before taking the first reading.
 - d. Shade the thermometer and record the temperature.
4. Record your findings on the chart below and on your map.

	Describe the Area	Temperature Reading
Area A	<input type="checkbox"/> sunny <input type="checkbox"/> shady	_____ F
Area B	<input type="checkbox"/> sunny <input type="checkbox"/> shady	_____ F
Area C	<input type="checkbox"/> sunny <input type="checkbox"/> shady	_____ F
Area D	<input type="checkbox"/> sunny <input type="checkbox"/> shady	_____ F

FIGURE 22 (CONT'D)

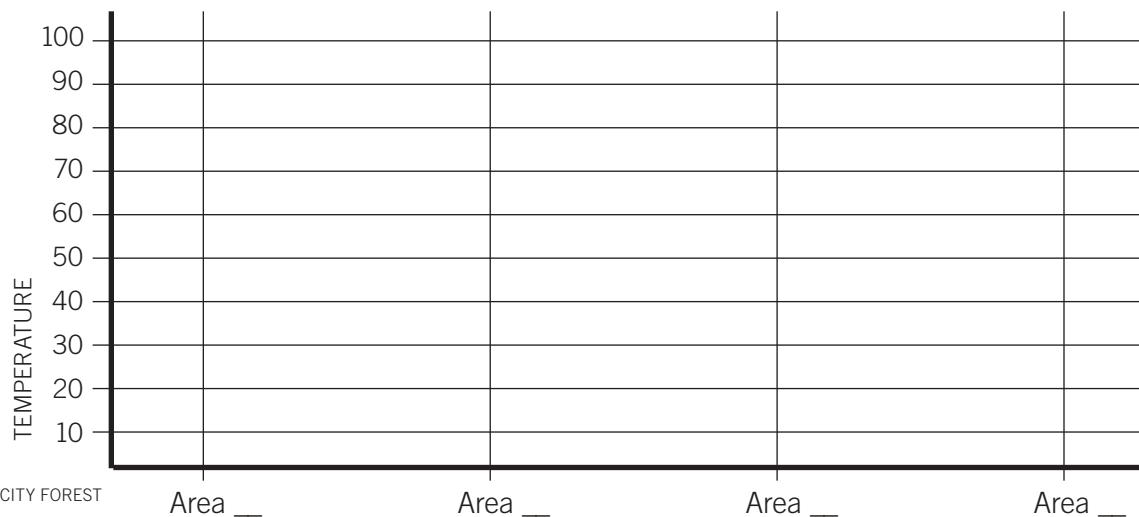
B. GRAPH YOUR FINDINGS

1. Using the graph to the right, draw a temperature bar for each area you recorded.
2. Looking at the bar graph, determine which area was the coolest. Circle the area on your map with a blue marker and label it "coolest."
3. Looking at the bar graph, determine which area was the hottest. Circle the area on your map with a red marker and label it "hottest."



C. GRAPH THE CLASS RESULTS

1. Using the graph to the right, indicate the area and draw a bar for each group's hottest area.
2. Looking at the bar graph, determine which area was the hottest.



SMOG PARTICLE INVESTIGATION

LOCATING SMOG PARTICLES AROUND THE SCHOOL

PREPARATION

- Plan out locations on the schoolyard to conduct the investigation, including plant leaves, tree leaves, tables, bench tops, and cars.
- Decide whether you will conduct the investigation as one group or in student groups.
- Plan to conduct the investigation when it hasn't rained, for the best results.

PROCEDURE

1. Explain to the students that they will explore locations on their schoolyard where smog has settled from the sky. Discuss with the students what they think smog is and how it may be harmful to their health. Use the illustration outlining the different sources of smog (figure 23). Discuss how smog can be seen in the air as a brown haze in the sky, but that we can also see evidence of smog that has settled onto surfaces.
2. Take the students out into the schoolyard. Point out and explain the following:
 - Areas for testing.
 - How to take a folded piece of facial tissue and carefully wipe the chosen surface.
 - How to use the pen to write a number on the tissue and a corresponding number on the schoolyard map.
3. Break students up into working groups. Give each team their assigned location, a copy of the schoolyard map, several folded facial tissues, and a pen.
4. Have groups go out to their assigned area and conduct the smog particle investigation.
5. Back in the classroom, have groups observe their different samples. Use magnifiers, if possible. Ask groups to:
 - Observe the color of the particles.
 - Observe the amount of particle matter to determine which area has the most particles.
6. Have each group share their results.
7. Ask the students:
 - "Where did you find smog particles?"
 - "What areas seemed to have the most smog particles?"

MATERIALS

- Map of schoolyard – 1 per group
- Facial tissue – several per group
- Pen – 1 per group
- Magnifying glasses (optional)

SMOG PARTICLE INVESTIGATION (CONT'D)

- “Based on the location of the particles found, what could be the cause of the smog particles?”
- “What do you think happens to the smog particles when it rains?”
- “What can we do to help reduce the amount of smog particles at our school?”
- “What can we do to reduce the amount of smog particles in the air?”

RELATED CLASSROOM ACTIVITIES

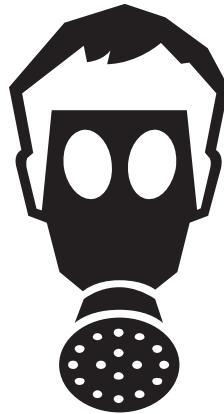
- Air Apparent
- Creature Comforts
- Tree Buddies

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Organize an energy conservation campaign to reduce the amount of energy used at your school by replacing regular light bulbs with compact fluorescents. At the beginning of the campaign, have a measurable goal to monitor and reduce the amount each month.

FIGURE 23

SOURCES OF SMOG



S

MOKE AND SOOT

from chimneys, BBQs and factories

M

OTOR VEHICLES

that burn gasoline and produce exhaust

O

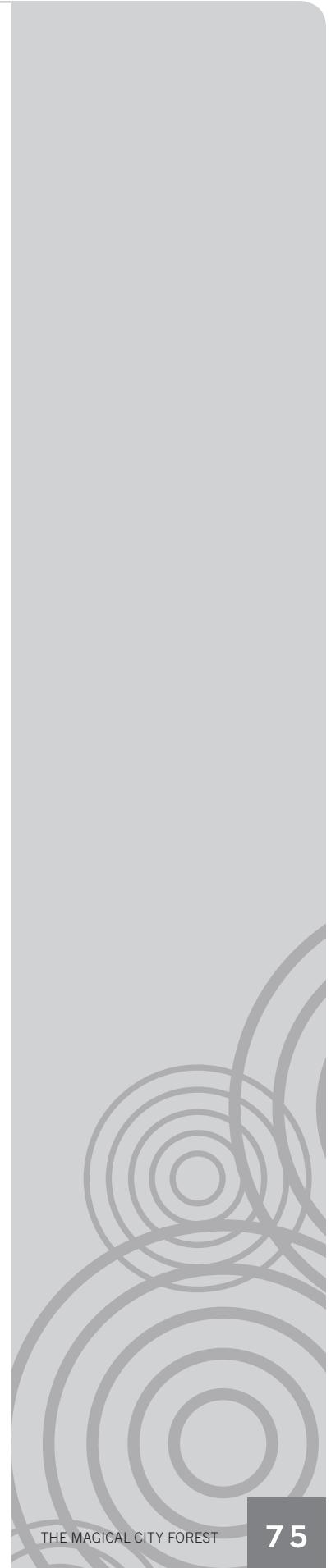
IL BURNING FACTORIES

such as electrical power plants and petroleum refineries

G

RAINS OF DIRT

from construction activities, cars and trucks, smoke stacks and chimneys, and dust





SCHOOLYARD TREE SITE INVESTIGATION

MAPPING AREAS AT SCHOOL IN NEED OF TREES

PREPARATION

- Decide whether you will conduct the investigation as one group or in student groups.
- Obtain a map of the schoolyard. If one is not available, a simple, hand-drawn map can be created. Be sure it includes a compass rose indicating the direction of north, south, east, and west.
- Make a copy of the schoolyard map as large as possible. Some copying facilities have blueprint copying available that prints on larger paper.
- Print out copies of the Schoolyard Scavenger Hunt worksheets.
- Plan your walking route throughout the schoolyard.

PROCEDURE

1. Explain to the students that they will explore locations on their schoolyard that might be good to plant trees, before passing out copies of the schoolyard map.
2. Looking at the map, explain to students the use of the compass rose to determine direction. Explain to the students that this is important to know because the sun shines on the south side of buildings more than on the north side of buildings.
3. Pass out copies of the Schoolyard Scavenger Hunt worksheet. Explain how they will mark their schoolyard map using the symbols listed to help them determine good locations for trees.
 - Large paved areas: trees help to create shade when the sun absorbs and reflects heat on paved areas.
 - Air-conditioning units: trees help shade air-conditioning units so they don't need to work as hard and to help conserve energy use.
 - South-side of buildings: trees help shade the south-side of buildings that receive the most sun exposure.
 - Areas exposed to cars, trucks, and busses: trees capture soot and smog particles from the air.
 - Areas that are unused and ugly: trees beautify the area.
 - Trees that already grow at the school.
 - Telephone wires overhead: the trees planted under telephone wires need to be the types that only grow to 20 feet tall.

MATERIALS

- Map of schoolyard – 1 per group
- Larger, blown-up version of the schoolyard map
- Schoolyard Scavenger Hunt (figure 24) – 1 per group

SCHOOLYARD TREE SITE INVESTIGATION (CONT'D)

4. As a class, take a walking tour of the school.
 - Help students orient their maps to north/south. Walk around with them so that they can get an understanding of what they are seeing on their school maps.
 - Using the Schoolyard Scavenger Hunt worksheet list, fill out the map either as a class or in student groups. Move on together, from place to place, covering the entire school area or your designated area.
5. Back in the classroom, go over the different findings and record the results on an enlarged map of the school, displayed at the front of the classroom.
6. Ask the students:
 - "Why was it important to explore the schoolyard by observing and mapping before deciding where to plant trees?"
 - "What areas did you find that were paved and hot?"
 - "Where were there air-conditioning units? Were they shaded by trees?"
 - "How did you locate the south side of buildings?"
 - "What areas did you find that were exposed to cars, trucks and busses?"
 - "What areas did you find that were in need of beauty?"
 - "Where were trees located already?"
 - "Where were telephone wires located?"
 - "Looking at the map, what are possible locations that need trees?"
 - "What benefits will trees bring to these areas?"

RELATED CLASSROOM ACTIVITIES

- Islands of Heat
- Tree Buddies

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Work with school facility managers, PTA or site council members to plant a tree in an area that needs to be shaded including the south-side of a building, air conditioning unit or places where children gather.

FIGURE 24

SCHOOLYARD SCAVENGER HUNT

In each area of the school, look around and record on your map any of the characteristics you find. Use the symbols below:

1. Look for areas in need of shade:

a. Hot paved areas



b. Unshaded air-conditioning units



c. South side of the building.....



2. Look for areas that have soot from cars, trucks, and busses ..



3. Look for areas that are ugly and unused



4. Look for trees that already grow here



5. Look for telephone wires overhead





TREE CARE INVESTIGATION

SURVEYING THE SCHOOLYARD FOR TREE CARE NEEDS

PREPARATION

- Decide whether you will conduct the investigation as one group or in student groups. This will depend on the number of trees on the schoolyard or surrounding the school.
- Obtain a map of the schoolyard. If one is not available, a simple, hand-drawn map can be created.
- Print out copies of the Schoolyard Tree Care Survey worksheet.
- Plan your walking route, from tree to tree, throughout the school.

PROCEDURE

- Explain to the students that they will survey trees at their school to determine if they need care to help them grow and thrive.
- Pass out copies of the schoolyard map. Explain to the students how to mark their schoolyard map to indicate where trees are located at the school and assign the tree a number.
- Pass out copies of the Schoolyard Tree Care Survey worksheet. Explain to the students how to fill out the Schoolyard Tree Care Survey for each tree that they find. They will indicate whether the tree:
 - Needs weeds and grass removed for 4 feet out from the trunk of the tree. Weeds are the small plants that grow up around the base of the tree. Weeds and grass use up soil nutrients and water the tree needs.
 - A berm needs to be built around the tree (young trees only.) The berm is like a donut ring that surrounds the tree and helps to hold water in when watering the tree.
 - Needs mulch. Mulch is the protective layer of leaves and wood chips over the soil around the tree. It feeds the soil, helps prevent water evaporation, and protects the roots of the tree. There should be a 3 inch layer of mulch around the base of the tree. Mulch should not be placed up against the trunk!
 - Needs watering. Dig down into the soil with a finger to check the soil. If the soil is dry it needs water. If the soil is wet it does not need water. Deep watering is ideal with no less than 15 gallons of water.
 - Has stakes and ties. If the tree is large enough, stakes and ties should be removed. If the tree is still young, check to see that stakes and ties are not loose or rubbing the bark of the tree and should be adjusted.

MATERIALS

- Map of schoolyard – 1 per group
- Schoolyard Tree Care Survey (figure 25) – 1 per group

TREE CARE INVESTIGATION (CONT'D)

4. As a class, take a walking tour of the school indicating trees on their school map and filling out the survey.
5. Back in the classroom, go over the different findings.
6. Ask the students:
 - “Did any of the trees need weeding?”
 - “Did any of the trees need mulch?”
 - “Did any of the trees need a berm?”
 - “Did any of the trees need stakes removed or adjusted?”
 - “Did any of the trees need watering?”
 - “When trees are healthy, what benefits do they provide our school?”
 - “What can we do to help the trees at our school be healthy?”

RELATED CLASSROOM ACTIVITIES

- Air Apparent
- Islands of Heat
- Tree Buddies
- The Tree is Like Me!

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- Adopt trees on campus. Work with the school facilities manager, PTA or site council members to help care and maintain the trees.

FIGURE 24

SCHOOLYARD TREE CARE SURVEY



1. Assign a number to the trees at your school and mark them on your schoolyard map.
2. Use the survey below by placing a check mark in the box to show what tree care is needed.

	TREE 1	TREE 2	TREE 3	TREE 4	TREE 5
Weeds/grass need to be removed					
Berm needs repair					
Mulch needed					
Water needed					
Stake/tie needs to be removed or adjusted					



WASTE INVESTIGATION

IDENTIFYING WASTE AT SCHOOL

PREPARATION

- Decide if you will conduct the investigation as one group or in student groups.
- Print out copies of the Schoolyard Waste Survey worksheet.
- Walk around the school ahead of time to get an idea of areas to investigate. This could be the cafeteria area after lunch, in trash cans around the school, and playground.

PROCEDURE

1. Explain to the students that they will survey waste at their school. Discuss where they think trashed items might be found.
2. Pass out copies of the Schoolyard Waste Survey worksheets and assign areas around the school to survey. Pass out gloves for the students to wear if checking trash cans.
3. Instruct students on how to use the Schoolyard Waste Survey worksheet, using tally marks to identify what is found. Clarify the difference between “trash” items and “recyclable” items.
4. As a group, or in separate student groups, go to the different areas of the schoolyard to survey waste found.
5. Back in the classroom, have student groups share their findings.
6. Ask the students:
 - “Which items were trashed the most?”
 - “What items could be recycled instead of trashed?”
 - “Were there fruits and vegetables that could be composted?”
 - “What items are actually trash and cannot be recycled?”
 - “Were there any items that could be reduced by using something else?”
 - “How much of the trash was on the ground compared to being in the trash can?”
 - “What can we do to help the waste at our school?”



MATERIALS

- Schoolyard Waste Survey (figure 26) – 1 per group
- Pencil – 1 per group
- Gloves – 1 pair per student

RELATED CLASSROOM ACTIVITIES

- Water Destination Relay
- Creature Comforts
- Is it Trash or Treasure?
- Treasures in Disguise

SAMPLE SERVICE LEARNING PROJECT

- For a complete list, see page 96.
- For the most common trash found, figure out what can be done to eliminate the source of this trash (i.e., if the majority of the trash is plastic bags, can we do a campaign to reduce plastic bag use and suggest using canvas bags instead)?

FIGURE 26

SCHOOLYARD WASTE SURVEY



Name: _____ Date: _____

Location of Investigation: _____

1. Put on gloves before checking trash cans.
2. Under the two columns labeled "trash" and "recyclables" keep a tally of how many of each item are found. Place any items not listed, under "other."

TRASH	ITEMS FOUND	TALLY
	Candy Wrappers	
	Food Packaging	
	Styrofoam Products	
	Food	
	Other:	

RECYCLABLES	ITEMS FOUND	TALLY
	Glass Bottles/Jars	
	Metal/Aluminum Cans	
	Plastic Bottles	
	Paper Products	
	Other:	



CLASSROOM ECO-INVESTIGATION

CALCULATING ECO-ACTIONS IN THE CLASSROOM

PREPARATION

- Make an enlarged copy of the Eco-classroom Survey (figure 27). Adjust the survey, as needed, to more accurately reflect your classroom.
- Pin up the Survey where the students can see it.

PROCEDURE

1. Explain to the students that they will survey their classroom to see how well they are doing, as a class, to help the city forest, right now.
2. Explain that each action listed has a value of 10 points. Points are received for every action they, as a classroom, are already taking.
3. Go down the list and let the students respond and decide whether they can claim the points for each of the actions.
4. Add up the points to see if the class is:
 - Eco-Heroes = 150 points and over
 - Eco-Helpers = 100 to 140 points
 - Eco-Starters = 90 points and under
5. Ask the students:
 - “Which actions are we good at?”
 - “Which actions are we not so good at?”
 - “What can we do to get to the next level?”

RELATED CLASSROOM ACTIVITIES

- Water Destination Relay
- Tree Buddies
- Is it Trash or Treasure?
- Treasures in Disguise

SAMPLE SERVICE LEARNING PROJECT

- For a more complete list, see page 96.
- Conduct an awareness campaign encouraging “no waste” lunches by using reusable lunch boxes and containers instead of paper and plastic bags.

MATERIALS

- Eco-classroom Survey (figure 27)

FIGURE 27

ECO-CLASSROOM SURVEY

Answer the questions to reflect on the environmental actions our classroom is currently practicing.
Award 10 points for every action performed as a class right now.

ECO-HEROES = 110 POINTS AND OVER

ECO-HELPERS = 60 TO 100 POINTS

ECO-STARTERS = 50 POINTS AND UNDER

- We bring our lunch in reusable containers or recycle lunch waste at school.
- We keep our classroom clean and neat. We don't litter.
- We don't let water run when using the classroom sink.
- We collect excess sink water to use for other things (water plants, etc.)
- We collect glass, aluminum, plastic, or paper for recycling. (10 points for each type.)
- We re-use items for classroom needs (egg cartons, glass jars, etc.)
- We use both sides of a sheet of paper.
- We have more items in the recycle bin than in the trash bin at the end of the day.
- We water and care for plants in our classroom or a schoolyard garden.
- We pick up litter around our school.
- We compost our fruit and vegetable scraps or maintain a worm bin.
- We adopted one or more trees around our school and care for them.
- We started an Eco-club.
- Add your own: _____



**SERVICE
LEARNING
PROJECT**



REFLECTION

SHARING WHAT WAS LEARNED

Students reflect on what they have observed and learned and using information from their investigations, write a news article about their findings.

PROCEDURE

1. As a class, have students reflect on what they have learned using the guided questions.
2. Have students write a news article for a local or school newspaper to present their thoughts on the environment at their school community. Give guidelines to include information on their investigations and how the evidence they collected influenced their ideas.
3. Invite students to present their thoughts to the class and share their ideas.

GUIDED QUESTIONS

- “What did you learn from your investigation?”
- “How can your knowledge about the city forest help you make good choices about how to help the environment at our school?”
- “What is an idea you have for helping the environment at our school or in the community?”



MATERIALS

- Any data sheets or other information from related lessons
- Pencil
- Paper
- Guidelines for writing news articles (optional)



MATERIALS

- Student reflection articles

BRAINSTORMING

DEVELOPING IDEAS FOR AN ECO SERVICE PROJECT

Students use their reflection articles to come up with a list of ideas. After answering specific questions about relevance and resources for each of the ideas, students decide on and name a project.

PROCEDURE

1. Use the students' reflection articles to begin a discussion that leads to planning their service learning project, and how these efforts can help the environment at their school or in their community.
2. Have students share the ideas they have, as you list them on the board. As a class, pick the top three ideas.
3. Have students use the guided questions for each of the top three ideas. Have them decide which one seems most practical and most exciting to them.
4. Have students develop possible names for their project. As a class, decide or vote on a final name.

GUIDED QUESTIONS

- “How would this project help the environment at our school or the community?”
- “Are there others that need to be involved to make this happen?”
- “What resources or help are needed to complete this project (money, skills, time, tools, etc.)?”
- “Can we accomplish the project in the amount of time we have to do it?”
- “How will we know if our project worked?”

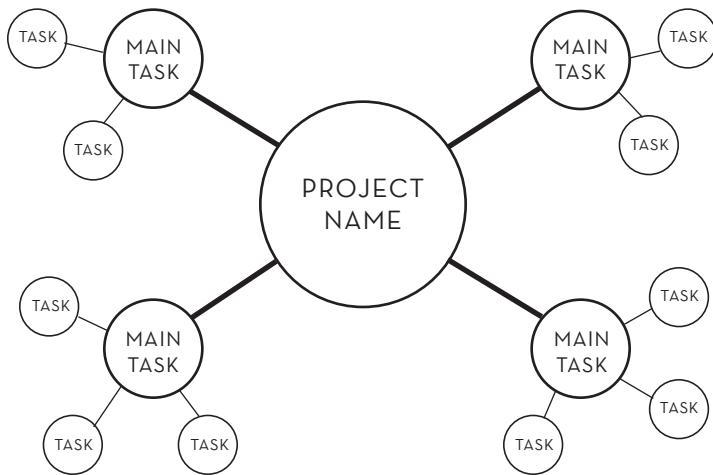
TASKS, MANAGEMENT AND COMPLETION

GOING FROM IDEAS TO COMPLETION

Students work out the tasks necessary to complete a project; and using the teacher as the Project Manager, follow the tasks to completion.

PROCEDURE

1. Have student groups brainstorm the tasks necessary to implement their project.
2. Help students organize the tasks. Use a large sheet of mural paper and organize the tasks using a technique called webbing:
 - Place the name of the project in the center and circle it
 - Write each suggested task, circle it, and connect it to the center.
 - Tasks associated with these main tasks should be circled and connected to the task.
3. Organize the tasks:
 - Group together similar tasks.
 - Put the tasks in order of when they need to be completed.
 - Write who is responsible for each task.
4. Create a timeline to accomplish the tasks. Set the completion date and work backwards.
5. Have students brainstorm what people might be able to support the project or provide helpful resources.
6. Help students follow the task list to implement and complete their project.



MATERIALS

- Mural paper
- Colored pencils

**MATERIALS**

- Food!

CELEBRATION + EVALUATION

CELEBRATING AND EVALUATING THE PROJECT

Students celebrate their accomplishments and evaluate what they have learned.

PROCEDURE

1. Wrap up the unit with a celebration. Work with the students to come up with celebration ideas, such as a pizza party, picnic or ice cream social.
2. Either individually, or as a class, have students answer the guided questions to evaluate the project.
3. Share your class accomplishments with a local reporter, or through a school display or assembly.
4. Share your accomplishments with TreePeople. We would love to hear from you about your project and what you accomplished. Please write or e-mail us at:
 - 12601 Mulholland Dr., Beverly Hills, CA 90210
 - elementaryed@treepeople.org

GUIDED QUESTIONS

- “What were the most successful parts of the project?”
- “What was the least successful part?”
- “What did you learn from your experience?”
- “What would you do differently next time and why?”
- “Who or what was influenced by your action?”
- “Would you like to get involved in another environmental service project?” “Why or why not?”

PROJECT IDEAS

WATER

- Work with school facility managers to remove concrete and add more trees, garden areas, and/or a rain garden to your campus to absorb water and prevent it from flowing into storm drains.
- Install a rain barrel or other water-capture device, where water flows out of a rain gutter and onto concrete or asphalt. Use this captured water for trees and garden planters instead of allowing it to flow into storm drains.
- Work with school facility managers to plant a rain garden on your campus where water floods, or to prevent water from flowing into storm drains.
- Organize a water conservation campaign to reduce the amount of water used at your school.
- At the beginning of the campaign, check the amount of water used by the school, and then have a measurable goal to monitor and reduce the amount each month.
- Reduce water use or runoff from pavement by landscaping an area using native or climate-appropriate trees, shrubs, flowers, and grasses that do not require a lot of water.
- Teach other students, teachers, administrators, and parents about water flow at the school watershed. Design a “watershed tour” of the campus. This could include: where water is coming from and where it is going, etc.

SOIL

- Maintain a 3-inch layer of mulch on soil surfaces throughout the school to prevent runoff and increase soil health. Monitor the results of your work.
- Start a composting program by maintaining a compost bin to prevent wasted fruits and vegetables from going into the trash. In the beginning, have a measurable goal to monitor and reduce the amount each month.

AIR

- Organize an energy conservation campaign to reduce the amount of energy used at your school by replacing regular light bulbs with compact fluorescents. At the beginning of the campaign, have a measurable goal to monitor and reduce the amount each month.
- Organize an awareness campaign to help the air by encouraging carpooling, reducing electricity use, and using compact fluorescent bulbs. At the beginning of the campaign, have a measurable goal to monitor and reduce the amount each month.



HELPFUL HINTS

- Plan your service or around a special day: Cesar Chavez Day (3/31), Martin Luther King, Jr. Day of Service (third Monday in January), Earth Day (4/22), or Global Youth Service Day (end of April).
- Have students update the principal on project progress to ensure support.
- Ask the school librarian to help connect literature to your service activity.
- Enlist other classes, teachers or after school programs for more help.
- Partner with a trusted colleague who can participate in the service activity for general support, ideas and sharing of responsibilities.
- Appoint a parent who can serve as the service learning representative and liaison at PTA meetings.
- Use the school newspaper or PTA newsletter to get the word out about your service activity.
- Showcase a successful service activity at open house, in the library, at a faculty meeting or school board meeting.

PROJECT IDEAS (CONT'D)

- Work with school facility managers to locate concrete and asphalt surfaces that can be repainted from dark to a lighter, more reflective, color. Measure the change in temperature.

TREES

- Work with TreePeople's Campus Forestry program to organize school-wide tree planting and tree care on your campus.
- Work with school facility managers to plant a tree in an area that needs to be shaded including the south-side of a building, air conditioning unit or places where children gather.
- Teach other students, teachers, administrators, and parents about trees and the need to care for them. Design a "tree tour" of the school. This could include: tree types, components of trees, benefits of trees, and how to care for them.
- Adopt trees on campus. Work with the school facilities manager to help care and maintain the trees.
- Adopt trees at a local park. Provide regular tree care and invite the community to participate.
- Design and distribute flyers or brochures about the care of trees. Create a way to measure the impact of flyers and brochures distributed.
- Volunteer with TreePeople at tree planting and tree care events.

WASTE REDUCTION

- Organize a student litter patrol to make sure trash is kept in trash cans and not left on the ground, particularly after snacks and lunches. Make posters to remind all students to reduce litter.
- Start a recycling program for paper, cans, glass, etc. At the campaign start, create a measurable goal to monitor and reduce the amount each month. Students may separate, weigh and recycle trash for cash, and generate money for school activities.
- For the most common trash found, figure out what can be done to eliminate the source of this trash (i.e., if the majority of the trash is plastic bags, can we do a campaign to reduce plastic bag use and suggest using canvas bags instead)?
- Conduct an awareness campaign encouraging "no waste" lunches by using reusable lunch boxes and containers instead of paper and plastic bags.

RESOURCES

RAINWATER HARVESTING TECHNIQUES

- City of Los Angeles Rainwater Harvesting Program
http://www.larainwaterharvesting.org/images/Homeowner_How-To_Guide.pdf
- LA County Department of Public Works Information and Workshops [\(www.smartgardening.com\)](http://www.smartgardening.com)
(888) CLEAN-LA or (888) 253-2652
- Common Ground Garden Program
http://celosangeles.ucdavis.edu/Common_Ground_Garden_Program/

RAIN BARRELS

- Clean Air Gardening
<http://www.cleanairgardening.com/>
- Hey!Tanks LA
<http://www.heytanksla.com/>

NATIVE PLANT ORGANIZATIONS & NURSERIES

- California Native Plant Society
www.cnps.org
- Rancho Santa Ana Botanic Garden
<http://www.rsabg.org>
- Theodore Payne Foundation
www.theodorepayne.org
- El Nativio Growers
www.elnativogrowers.com
(626) 969-8449
- Las Pilitas Nursery
www.laspilitas.com
(760) 749-5930
- Matilija Nursery
www.matilijanursery.com; Matilija@verizon.net
(805) 523-8604
- Tree of Life Nursery
www.treeoflifenursery.com
(949) 728-0685



TREEPEOPLE

Tree Planting & Tree Care
forestry@treepeople.org
(818) 623-4853

Volunteering
volunteer@treepeople.org
(818) 623-4879

ENVIRONMENTAL EDUCATION

CREEC
<http://www.creec.org/region11/>

SERVICE LEARNING

National Service Learning Partnership
<http://www.service-learningpartnership.org/site/PageServer>

National Youth Leadership Council
www.nylc.org/

Youth Service California
<http://yscal.org/cm/Home.html>

RESOURCES (CONT'D)

COMPOSTING & VERMICULTURE

- City of Los Angeles
http://www.lacitysan.org/solid_resources/recycling/services/compost.htm
The City of Los Angeles holds free composting workshops and bin sales.

MULCH

Many arborists and tree trimmers will deliver bulk quantities of mulch for free. Look on-line or in the yellow pages for an arborist located near your site. Minimum delivery is usually 10 cubic yards. Listed below are a few suppliers.

- Ken Billington
(213) 308-8112
- Matt Wood
(213) 923-3109
- Mellinger Tree and Landscape Service
(310) 454-2033.

You can also purchase large quantities of mulch from the following supplier:

- Southern California Shaving
(818) 768-6722
12700 N. Lopez Canyon, Sylmar

WASTE REDUCTION

- LA County Department of Public Works Information and Workshops <http://dpw.lacounty.gov/epd/Recycling/>
(888) CLEAN-LA or (888) 253-2652
- Terra Cycle
www.terracycle.net
- Planet Green
www.planetgreenrecycle.com

ENERGY CONSERVATION

- Flex Your Power
www.aqmd.gov/aqmd/flexpower.html