2007

Teaching Global Sustainability in the Primary Grades: A K-4 Curriculum Guide

Facing the Future, Western Washington University

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Teaching Global Sustainability in the Primary Grades

A K-4 Curriculum Guide
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Facing the Future is a nonprofit, nonpartisan organization providing resources and community action opportunities on global issues and sustainability for teachers, students, and the public. For more information and to order copies of this guide, visit our website or contact us at:

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# Table of Contents

About This Curriculum Guide ............................................. 4

Overview: Lessons and Objectives ..................................... 7

Lesson 1 – Map of Myself: Identity and Culture ............... 8

Lesson 2 – Connections All Around:  
Me, My Food, and My Environment ................................. 18

Lesson 3 – Woods, Water, and Wild Things:  
Biodiversity in the Forest-Stream Habitat ...................... 32

Lesson 4 – Systems: Problems and Fixes ........................... 50
About This Curriculum Guide

What Is Global Sustainability?
Global sustainability is an attempt to provide the best outcomes for the world's human and natural environments — both now and into the indefinite future. The guiding principle of sustainability is that current generations are able to meet their needs without jeopardizing the ability of future generations to meet their needs. To achieve this goal, the health and needs of the environment, the economy, and society are considered.

Global sustainability education provides a practical and inspired framework for young people to understand contemporary issues not as insurmountable problems, but as opportunities to create a better world. It provides knowledge, skills, and dispositions that students need to ensure the well-being of themselves and others, and to make a positive contribution, both locally and globally.

Curriculum Design
This four-lesson unit has been designed to provide primary educators with a unique, age-appropriate curriculum that addresses core concepts related to sustainability. The lessons are adapted for primary grade students from lessons in Facing the Future's book, Engaging Students through Global Issues.

This curriculum is aligned with national science and social studies standards for grades K-4. In keeping with the North American Association for Environmental Education's Excellence in Environmental Education: Guidelines for Learning (Pre K-4), the lessons examine environmental issues with an emphasis on a learning experience that is simple, local, and personal.

The curriculum has been crafted with the overarching goals of immersion,
engagement, and production. Using an interdisciplinary approach, key concepts are elaborated through diverse perspectives and learning modes. These include role plays, simulations, singing, art, children’s stories, writing, and speaking. For each lesson, students produce or present a finished piece that expresses their understanding of the core concepts. Rubrics are included for assessment purposes.

The lessons are designed to accompany popular children’s stories and songs. These stories are readily available at school or community libraries. Song lyrics are included in the lesson with links to online recordings.

**How to Use the Curriculum**

The four lessons can be taught individually, together, or in any sequence. Parts of a lesson may be taught separately. Each lesson requires 2-5 hours of class time, and may be taught within one school day or across an entire unit or term. Where alternatives are provided for readings or activities at the K-2 or 3-4 grade level, teachers should use their own judgment as to which option best suits their students.

**Each Lesson Contains the Following Features:**

- Overview
- Inquiry questions
- Objectives
- Time required
- Key issues/concepts
- Subject areas
- National standards consistency
- Teacher background reading
- Vocabulary
- Materials list
- Detailed activity steps
- Reflection questions
- Assessment rubrics
- Extension and service learning opportunities
- Reproducible handouts
Overview:
Lessons and Objectives

Map of Myself: Identity and Culture

Lesson 1
- Explore personal and cultural identity through nonverbal activity, songs, personal maps, and a story.
- Create a map that expresses personal and cultural identity.
- Explore the hopes and challenges presented by diverse identities.

Connections All Around: Me, My Food, and My Environment

Lesson 2
- Identify Connections, Cause and Effect, and Surprising Results in our food, lives, and nature.
- Visually display what it takes to bring an everyday food item to our table.

Woods, Water, and Wild Things: Biodiversity in the Forest-Stream Habitat

Lesson 3
- Question students' connection to the land.
- Role play and visually display the connections and needs of species in a forest-stream ecosystem.
- Understand the importance of biodiversity and the role that humans play in the health of ecosystems.

Systems: Problems and Fixes

Lesson 4
- Identify a variety of systems dynamics and concepts by reading children's stories and singing children's songs.
- Experience key systems concepts through a group game and a variety of exercises.
- Either orally or in writing, apply systems thinking to a scenario from students' own lives, describing a problem, fixes, perspectives, and solutions.
Overview
Just as each unique natural species plays an essential role in the healthy biodiversity of nature, the unique identities of humans contribute to the diversity between and within cultures. The extent to which people recognize and cherish diverse identities is an important factor in the health of human communities. The concept of mapping personal and cultural identity is introduced through Sara Fanelli’s *My Map Book*. Students brainstorm personal and cultural identity and then produce a poster that “maps” their identity. A gallery walk to review student posters reveals differences in identity. Leo Lionni’s story, *Fish is Fish*, drives home the importance of maintaining one’s identity as separate from, yet still connected to, the identities of others. The lesson ends with the song, *So Much the Same*, which celebrates diversity and unity.

Inquiry/Critical Thinking Questions
- How does the world around me contribute to who I am?
- How can people and communities have their own special identities, yet still respect other identities and cultures?

Objectives
Students will:
- Explore personal and cultural identity through nonverbal activity, songs, personal maps, and a story.
- Create a map that expresses personal and cultural identity.
- Explore the hope and challenges presented by diverse identities.

Time Required
3-4 hours

Key Issues/Concepts
- Personal identity
- Cultural identity
- Diversity
- Unity

Subject Areas
- Language Arts
- Social Studies
- Art
- Music

National Standards Consistency
Social Studies (NCSS):
- Strand 1 – Culture;
- Strand 4 – Individual Development and Identity;
- Strand 9 – Global Connections

FTF Teacher Background Reading
*Global Issues and Sustainable Solutions*, Chapter 8
Vocabulary

- **Identity**: The special qualities that make each of us different.
- **Culture**: The behaviors, beliefs, arts, and products (things) of a community or group of people.
- **Diversity**: The way we are all special and different from each other.

Materials/Preparation

- Class set (or overhead transparencies) of the song lyrics: *So Much the Same* (Judy and David Gershon)
- Copy (or multiple sets) of *My Map Book* (Sara Fanelli)
- Class set of handout: *My Identity and Culture*
- Large poster paper and crayons, markers, or colored pencils
- One assessment rubric for each student
- Copy (or multiple sets) of *Fish is Fish* (Leo Lionni)

Activities

**INTRODUCTION: Nonverbal Identity**

20 minutes

1. Ask students to stand in a circle and to introduce themselves by demonstrating something unique about them — without using words! Instead, they should pantomime (act without speaking) a quality, characteristic, or interest that is part of their identity. For example, show us your love for dancing by pointing to your heart and then dancing, or your fear of swimming by pretending to swim, then struggling. The teacher should begin, and then go around the circle twice so that each student can offer 2 aspects of his/her identity.

2. Ask students to name the 2 things that each student demonstrated about his/her identity.

3. Ask for a definition of personal “identity.” Write this definition of identity on the board: *Identity: The special qualities that make each of us different.* (Note that identity is actually synonymous with “individuality.”)

4. Give students a definition of “culture.” Write this definition on the board: *Culture: The behaviors, beliefs, arts, and products (things) shared by a group of people.*

5. Ask students to brainstorm some of the behaviors, beliefs, arts, organizations, and things that are common to their cultures. This may include age-driven behaviors, religious or political beliefs, languages, types of art or music, local organizations, clothing, and technology or anything that is “built.”
STORY: My Map Book (Sara Fanelli)
20 minutes

Background information for the teacher:

Sara Fanelli was born in Italy and lived in London when she wrote My Map Book. She uses “maps” as a metaphor to explore personal identity, mapping her face, neighborhood, family, dog, and even her heart. The book is primarily visual, with labels rather than narrative text.

1. Together, read this very short picture book, taking time to admire and discuss the different types of maps that Sara Fanelli created. As you proceed, have students try to predict what map might come next.

2. Discussion questions:
   • What is a map?
   • What kinds of maps did Sara paint?
   • What have we learned about Sara’s identity through her maps?
   • How is she different or the same as you?
   • What might be different about her culture?

3. How are the pages “Map of my Family” and “Map of my Heart” different? (They are not mapping physical places like her bedroom and school, but people, favorites, and feelings.)

BRAINSTORM: Identity and Culture
20 minutes

Using the handout, My Identity and Culture, students list some of the things that make up their own personal identity and culture. K-2 students may complete this task orally or the teacher may list a sampling of items on the board. Alternatively, K-2 students can draw small images of their favorite things – a “visual brainstorm.”

POSTER AND SCAVENGER HUNT: Map of Myself
45 minutes

1. Have students make a map (like one of the pages in My Map Book) that shows their identity and culture through pictures and words. Study the handout, My Identity and Culture, to get ideas. Students do not have to include everything on their map, but encourage them to include a variety of images, including activities, beliefs, and objects.

2. Have them begin by making an outline that takes up most of the page, perhaps in the shape of a body, a head, or a heart. They can choose any outline shape that they feel good about. For example, if a student loves dragons or guitars she might want
to make an outline of a dragon or a guitar for the border of her map. It might be wise to draw this outline in pencil first, then use something bolder, like a marker, to make it stand out clearly.

3. Then, using a pencil, students fill the inside of their map outline with smaller objects: the things that make up their identity and culture (referring to their handout). Label these objects. Remind them to remember how Sara Fanelli did this using simple shapes and block print labels. Stick figures are fine. They can also use symbols, such as a peace sign, or a religious symbol, etc.

4. When all of the posters are reasonably complete, have students do a silent gallery walk or scavenger hunt where they will be looking for:

- One thing that surprised them
- One thing that is very different from their own identity
- One thing that is similar to their own identity
- One thing that they do not understand

5. Have a few volunteers report to the class on what they found: Surprises? Differences? Similarities? Confusion?

6. Discussion: Why are there differences in our identities? Why is that a good thing? (You may wish to share the Native American metaphor of the Central Fire, which, like culture, has a life of its own, but is created by diverse individuals and everyone who brings wood to it.)
STORY: Fish is Fish (Leo Lionni)
20 minutes
Background information for the teacher:

Fish is Fish is about 2 friends who play together everyday: a tadpole and a fish. Fish is growing bigger, but Tadpole is growing bigger and changing in appearance as well. Fish cannot understand why Tadpole grows legs and he does not. One day, Tadpole changes completely and leaps out of the water where they had always lived. Fish thinks about his friend every day. He wonders why Tadpole left and if he will ever return. Finally, one day Tadpole did return, but he was no longer a tadpole; now he was a frog, and he had many great stories to tell Fish. He told of all the great and beautiful things that he saw. As Fish listens to Frog’s tales of the world, he imagines all the characters as fish. The story highlights the limits of identity, and how we need to admire the differences around us – but also develop and maintain a healthy sense of our own identity and not project it onto others.

1. Read the book, Fish is Fish aloud. Pause occasionally to ask students to try to predict what events or images might come next.

2. Reflection questions:
   - What did the tadpole discover he had grown during the night?
   - Why was Fish unhappy?
   - What was the source of his confusion?
   - Where did the frog go after he climbed out of the water and onto the grassy bank?
   - What kinds of things did the frog tell the fish that he saw while out in the world?
   - How did Fish get his new identity?
   - In the end, did the frog agree with Fish when he said, “Fish is fish?”
   - How do you think Tadpole would describe YOU?

SONG: So Much the Same (Judy and David Gershon)
15 minutes
Background information for the teacher:

Judy and David have released 15 albums and 4 videos and have sold over 5 million recordings worldwide. Their credo, “music is not a spectator sport,” explains their interactive musical style. To learn more, visit: http://judyanddavid.com.

1. Ask students to explain what the following line means: “Takes all kinds of people to make the world go round.”

2. Together, with or without musical accompaniment, sing So Much the Same as a chant (either speaking rhythmically or singing the words). Gather the students in a circle and lead them through the song with clapping, stomping, or simple hand/body gestures to go with the lyrics. This will help students to both learn the lyrics and understand concepts.

3. Discussion: How are we “so much different, so much the same?” How can people be unique in their identity and culture, but still enjoy other identities and cultures?
Grades 3-4 Extension Activities

- Visit www.EdChange.org or www.Tolerance.org to learn about and lead activities on multicultural awareness and activism for tolerance in your school, on sports teams, or in communities. Whenever possible, give students leadership responsibilities for activities or events.
- Have students write their own version of My Favorite Things, using the same melody and lyrical device (e.g., stanza structure). Lyrics for the original song are included at the end of this lesson.

Action Projects

- Interview people in the community (either the school community or the students' larger community) to learn about their interests, their roles in the community, and what makes them special. Students prepare interview questions and take pictures or make portraits of the individuals they interview to create a book about the people who make up their community.
- Survey people in the community to find out where they were born, when they moved to their current location, and why. Use maps to locate where community members are from. Create a mural that depicts the unique identities found in the local community.
- Engage in an oral history project by having students interview older students ("student buddies") and create biographies of their partners. A celebration can serve as a venue to share the oral histories.

Additional Resources

- From the EdChange Multicultural Pavilion, a rich collection of ice-breakers, strategies, and activities on multicultural awareness: http://www.edchange.org/multicultural/activityarch.html
- For Scholastic lessons on diversity: http://teacher.scholastic.com/professional/teachdive/
- For news, awareness-building activities, and action projects focused on fighting hate and intolerance, visit Teaching Tolerance: http://www.tolerance.org/
- For an international perspective and a Universal Declaration on Cultural Diversity, visit the Office of the United Nations High Commissioner for Human Rights: http://www.ohchr.org/english/law/diversity.htm
My Identity and Culture

NAME _____________________

**Identity:** The special qualities that make each of us different.

**Culture:** The behaviors, beliefs, arts, and products (things) of a community or group of people.

**DIRECTIONS:** Write key words for each category. For example, next to FAMILY, you might write the names of your parents, siblings, and grandparents. Next to ETHNIC BACKGROUND, you could write down where your family came from, the race or races of your family, and their ethnic or cultural roots.

MY FAMILY:___________________________

MY ETHNIC BACKGROUND: ___________

MY HOBBIES: ________________________

MY FAVORITE PLACES:________________

MY SCHOOL:_________________________

MY NEIGHBORHOOD:______________

MY LANGUAGE: ______________________

MY BELIEFS (personal, family, or religious): ________________________________

MY PETS: _________________________

MY FAVORITE THINGS: _______________

MY FAVORITE FOODS: ______________________
### Assessment Rubric • Map of Myself

**Student:**

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXCEEDS STANDARD</th>
<th>MEETS STANDARD</th>
<th>BELOW STANDARD</th>
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<tr>
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<tr>
<td>The map outline is clear.</td>
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<tr>
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<tr>
<td><strong>Content</strong></td>
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<tr>
<td>The images show thoughtful selection of aspects of personal and cultural identity.</td>
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<tr>
<td>The images are varied and there are at least 6: 2 each from the 3 areas of culture: activities, beliefs, and things.</td>
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So Much the Same
By Judy and David Gershon

For lyrics and an iTunes link online: http://judyanddavid.com/Songbook/S.html#somuchthesame

In my class we play a game
It's called so much different, so much the same
You gotta stand up tall if we're talking about you
Then sit back down — that's all you gotta do
It's so much different, so much the same
So much different, so much the same

If your hair is brown, stand up tall
If your hair is black, stand up y'all
If your hair is blond, stand up high
If your hair is red, give it a try
Stand up if your hair's not one of these
Now sit back down everybody if you please

It's so much different...

If your eyes are brown, stand up tall
If your eyes are blue, stand up y'all
If your eyes are green, stand up high
If your eyes are hazel, give it a try
Stand up if your eyes aren't one of these
Now sit back down everybody if you please
We got kids of every shape and size
Different colour skin, different colour eyes
Some from the country, some from a town
Takes all kinds of people to make the world go round

If you love chocolate, stand up tall
If you love pizza, stand up y'all
If you love spaghetti, stand up high
If you love ice cream, give it a try
If you love rotten eggs, stand up tall
If you love stale bread, stand up y'all
If you love eating worms, stand up high
If you love hot mustard sundaes, give it a try
Now sit back down, sit back down
Takes all kinds of people to make the world go round
Sit back down everybody if you please.
My Favorite Things

By Richard Rogers and Oscar Hammerstein

For MIDI audio: http://www.geocities.com/EnchantedForest/Cottage/3192/Myfavorite.html

Raindrops on roses and whiskers on kittens
Bright copper kettles and warm woolen mittens
Brown paper packages tied up with strings
These are a few of my favorite things

Cream colored ponies and crisp apple strudels
Doorbells and sleigh bells and schnitzel with noodles
Wild geese that fly with the moon on their wings
These are a few of my favorite things

Girls in white dresses with blue satin sashes
Snowflakes that stay on my nose and eyelashes
Silver white winters that melt into springs
These are a few of my favorite things

CHORUS:
When the dog bites
When the bee stings
When I'm feeling sad
I simply remember my favorite things
And then I don't feel so bad

[Repeat all verses]
Connections All Around: Me, My Food, and My Environment

Overview
Ideally, prior to the classroom lesson, students take a field trip to a dairy farm, a produce farm, or a garden, with the goal of witnessing how staple foods are produced (a short video or picture book rich in details about farming can be substituted for the field trip). Back in class, students sing The Green Grass Grows All Around to introduce the concept of Connections. Students create a web diagram of all the resources associated with an everyday food item. Students present and discuss their food webs. To explore the relationship between Connections and Surprising Results, grades K-2 students read Laura Numeroff's If You Give a Mouse a Cookie, while grades 3-4 read Dr. Seuss's The Lorax. Students identify the concepts of Connections and Surprising Results in these children’s stories, then discuss what could have happened in the song and the stories to arrive at a more desirable result.

Inquiry Questions
- What does it take to make the things we eat?
- What are the connections between our food, ourselves, and our environment?

Objectives
Students will:
- Identify Connections, Cause and Effect, and Surprising Results in our food, lives, and nature.
- Learn and visually display what it takes to bring an everyday food item to our table.

Time Required
2-3 hours (plus optional field trip or video viewing)

Key Issues/Concepts
- Connections
- Cause and Effect
- Surprising Results
- Environment

Subject Areas
- Social Studies
- Science
- Language Arts
- Music

National Standards Consistency

Social Studies (NCSS):
- Strand 7 – Production, Distribution and Consumption
- Strand 9 – Global Connections

Science (NCES):
- Content Standard F – Science in Personal and Social Perspectives
FTF Teacher Background Reading
Global Issues and Sustainable Solutions, Chapters 4-6

Vocabulary
- **Connections**: Links or relationships between two or more things.
- **Environment**: All of the surroundings and conditions for people and other living things; where we live.
- **Natural Resources**: Materials in nature that are useful to humans, such as water, air, land, forests, fish and wildlife, topsoil, and minerals.
- **Surprising Results**: Unforeseen consequences can result from an attempted solution to a problem.

Materials/Preparation
- Class set (or overhead transparency) of the folksong, *The Green Grass Grows All Around*
- Copies of *My Food Web* template (2 for each student) OR butcher paper (1 sheet per group of 3-4 students) and marking pens (2-3 pens per group of 3-4 students)
- *If You Give a Mouse a Cookie* (Laura Numeroff) OR *The Lorax* (Dr. Seuss)
- Copies of Small Group Assessment Rubric (1 for each group) OR copies of Individual Assessment Rubric (1 for each student)

Activities
**DAY 1**
FIELD TRIP - Full Day
1. Arrange to visit a dairy farm, produce farm, or vegetable garden (many urban areas have public community gardens that allow student visitors). If possible, students will get to participate in some part of the farming process (e.g., feeding,
weeding, watering, harvesting). Help them to make the connection between plants or animals on the farm and food they eat.

2. Either on-site or upon returning to school, have students list all the things that go into producing a dairy product or vegetable and getting it to the table (e.g., water, soil, fertilizer, human labor, seeds, sun, processing plants, packaging, trucks, etc.)

OR...

VIDEO/DVD OPTIONS
30 - 90 minutes

Vrrrooommm! Farming For K-I-D-S

Viewers see how technology is linked to agriculture and to the use of natural resources and transportation. The video explores a modern farm and its seasonal preparation, planting, growing, and harvesting procedures. An info-card accompanying the video helps children to name and visualize some of the agricultural technologies in classroom follow-up.

Agriculture For Children DVD and Video Series
(www.libraryvideo.com, #V6570 (DVD)/ #K6665 (Video), 4 Volume Set, Grades K-2, 23 minutes each, Set: $119.80, Each: $29.95)

Field trips to farms, factories, and markets form the backdrop for the Agriculture for Children series. Children follow along as young hosts discover firsthand how agriculture provides us with the food we eat, clothing we wear, and places we live. Viewers follow the journey food makes from farms to our tables; learn how crops are grown and harvested, prepared, packaged, and transported to stores; and discover how technology has influenced all phases of food production. Sites range from orchards to rice fields, and the series explores how climate and weather affect the types of crops people grow and the kinds of animals they raise.

CLASS REFLECTION
30 minutes

Following the video, have students list all the things that go into producing a dairy product or vegetable and getting it to the table (e.g., water, soil, fertilizer, human labor, seeds, sun, processing plants, packaging, trucks, etc.).
DAY 2

INTRODUCTION
30 minutes

1. Direct students to draw or journal about farming, describing some of the steps involved in producing a raw food product. Students who have been on a field trip or viewed videos about farming can refer to those experiences. Others will need some prompting.

2. Ask the class: What does it take to make the things we eat? How does a meal get to our table?

SONG: The Green Grass Grows All Around
15 minutes

Background information for the teacher:

In this song we find that a hole in the ground has a root, tree, branch, twig, nest, bird, feather, and flea (i.e., increasing levels of detail and Connections in nature), ending with the absurd addition of an elephant on the flea! Hopefully, in the end, we still have a healthy system where “the green grass grows all around.”

1. Together (with or without MIDI audio or musical accompaniment), sing The Green Grass Grows All Around. Gather the students in a circle and lead them through the song with clapping, stomping, or simple hand/body gestures to go with the lyrics. This will help students to both learn the lyrics and understand concepts.

2. Identify the concept of Connections in the song. Ask the students where the song begins (with a hole in the ground) and ends (with an elephant on a flea). What are some of the steps in between? What does this song say about connections in nature? Can you
think of other examples of connections in nature? (e.g., Food chain: a tiny fish is eaten by a small fish who is eaten by a larger fish, and so on.) In your life? (Connections to friends, family, pets, play, etc.) What is the Surprising Result in the song? What does this song teach us about little Connections and Surprising Results?

GROUP OR INDIVIDUAL WORK:
Food Webs
45 minutes

Tell students that the Connections and Surprising Results explored in the song about the tree can also be found in the food we eat.

For Grades K-2 students who will first practice as a whole class, then work individually...

1. Give a brief verbal/visual demonstration on the whiteboard of the food web activity, with students copying the example onto 1 of their 8.5 x 11 templates for practice. Ask students what it takes to create a hamburger (cow, bun, lettuce, etc.). Draw the burger in the center of your web example, with lines extending to the separate steps. Ask students to name some of the steps for growing, packaging, and transporting the cow (e.g., grass, water, feedlot/corn, slaughterhouse, meatpacking/butcher, and packaging). Diagram these Connections for the cow part of your web, listing things like the train or truck that brings the cow to the slaughterhouse and the beef to restaurants and stores. Ask students if any of the Connections seem surprising to them (e.g., that it takes water to “grow” a hamburger or that there are so many steps involved in something that seems so simple.)

2. Write 1 sentence at the bottom (or on the back) of the template about what it takes to make a hamburger. Students should try to include all the major parts of the food item, but not necessarily all the details. A sample starter would be, “A hamburger uses…”

3. When students have completed the practice template and sentence for their hamburger food web, ask them to choose (or assign them) a food item for a second food web: either pizza, a PB&J sandwich, or a taco.

4. Using the handout, My Food Web, have students draw their food item in the central oval. Write or draw each component part of the food item in the rectangles (for example, for a PB&J, this would include peanut butter, jelly, and bread). Write or draw the main ingredients of each part in the circles (for example, you need fruit to make jelly). Students can write Connections
(for example, you cook fruit and add sugar to create jelly) next to the arrows.

5. Circulate to help them draw the item in the center and list Connections and Surprising Results around the center. The teacher will need to circulate to help students identify the components of their food item, as well as its origins and processes associated with it.

6. Have students write 1 sentence at the bottom (or on the back) of the template about what it takes to make a (food item). A starter sentence would be, “To make pizza, it takes...”

7. Ask for volunteers to present their food web (1 each for pizza, sandwich, and a taco). As the volunteers share Connections and Surprising Results, invite other students who worked on the same food item to contribute to the discussion.

For Grades 3-4 students who can work effectively in small groups...

1. Give a brief verbal/visual demonstration on the whiteboard of the small group poster activity. Ask students what it takes to create a hamburger (cow, bun, lettuce, etc.). Draw the burger in the center of your web example, with lines extending to the separate parts. Ask students to name the steps for growing, packaging, and transporting the cow (e.g., grass, water, feedlot/corn, slaughterhouse, meatpacking/butcher, and packaging). Diagram these Connections for the cow part of your web, including things like the train or truck that brings the cow to the slaughterhouse and the beef to restaurants and stores. Include some Surprising Results, like overgrazing or a diet that is overly rich in fats. Conclude by reiterating what small groups must do for their food web: draw the food item in the center of their poster, and then draw lines out to the different parts of the item, including Connections and Surprising Results.

2. Divide the class into groups of 3-4. Assign each group either pizza, PB&J sandwich, or a taco. Give each group poster paper and markers. Explain that they should first brainstorm together to agree on the parts of their food item, then work together to create the web (words and a picture in the center). All students should participate in the creation of the poster by working on at least 1 part of the food item. All students will share in poster presentation. The teacher will need
to circulate to help groups identify the components of their food item, as well as its origins and the processes associated with it.

3. Have each group give a brief presentation of their poster. Each student should present 1 part of the poster and emphasize 1 thing that surprised them about this part of the poster, either a Connection or a Surprising Result.

**STORY**
**20 minutes**

**For Grades K-2 Students...**
*If You Give a Mouse a Cookie* (Laura Numeroff)

Background information for the teacher:
This story begins with a hungry little mouse who eats a cookie. The mouse then wants milk to go with the cookie, then a mirror to check for a “milk moustache,” then scissors to trim the moustache, then a broom to clean up the trimmings—and so on. At the end, tired and thirsty from all this effort, the mouse wants a glass of milk and remembers that a cookie would go well with the milk. In this story, students can see Connections—how one thing leads to another, sometimes with Surprising Results, and sometimes taking you back to where you started.

1. Ask students to recall where there were Connections in nature in the song and in the food web. Ask students to describe where there were Surprising Results in nature in the song and in the food web. Prompt students to think about Connections and Surprising Results as you read the story.

2. Read *If You Give a Mouse a Cookie* aloud (teacher and/or students), pausing to show illustrations of key events. Pause occasionally to ask students to try to predict what events or images might come next.

3. Discuss the story. Ask students to recall the series of items the mouse wants and draw a simple loop diagram on the board with an icon for each item. (Milk, cookie, mirror, scissors, etc. The loop should end up at milk.) How did these Connections happen? (Discuss Cause and Effect or give them examples such as dominoes falling.) Did the mouse know at the beginning what it might want later? How did small decisions have Surprising Results for the mouse? Can you think of a situation in your life in which one thing led to another, with a Surprising Result?

**For Grades 3-4 Students...**
*The Lorax* (Dr. Seuss)

Background information for the teacher:
In this story, the Lorax warns of the dangers of harvesting Truffula Trees to manufacture Thneeds, but the Once-ler and his people proceed with mass production. Sure enough, the habitat suffers almost to the point of complete destruction. A variety of unique species are endangered, but hope is preserved as the Once-ler has saved one Truffula seed. The tale illustrates the concepts of Connections and Surprising Results.

1. Ask students to recall where there were Connections in nature in the song and in the food web. Ask students to describe where there were Surprising Results in nature in the song and in the food web. Prompt students to think about Connections and Surprising Results as you read the story.

2. Read *The Lorax* aloud (teacher and/or students), pausing occasionally to ask students to try to predict what events or images might come next.

3. Discuss the story. Ask students to recall the series of items the mouse wants and draw a simple loop diagram on the board with an icon for each item. (Milk, cookie, mirror, scissors, etc. The loop should end up at milk.) How did these Connections happen? (Discuss Cause and Effect or give them examples such as dominoes falling.) Did the mouse know at the beginning what it might want later? How did small decisions have Surprising Results for the mouse? Can you think of a situation in your life in which one thing led to another, with a Surprising Result?
or students), pausing to show illustrations of key events and figures. Pause occasionally to ask students to try to predict what events or images might come next.

3. Discuss the story using the following questions:
   - What happened to the Truffula Trees and why?
   - Why didn't Once-ler and his family stop harvesting the trees after the Lorax's warning?
   - When did the situation get out of control? Why?
   - What choices were made?
   - Who was responsible?
   - What were some of the Connections and impacts in their environment? (Discuss Cause and Effect.)
   - How did seemingly small decisions have big results or Surprising Results for the environment and its inhabitants?
   - What could they have done differently?
   - Why is there hope at the end of the story? (Because Once-ler saved a seed.)
   - Can you think of a situation in your life in which one thing led to another, with a Surprising Result?

REFLECTION
15 minutes

1. Where do we see Connections, Cause and Effect, and Surprising Results in our lives? In today's song and story? What can we learn from the song and story? Think about the results of our actions and how things are connected ("Look before you leap").

2. Where did we see Connections and Surprising Results in our food webs? Where does our food come from? Why does it take more to make some foods than others? Consider Cause and Effect. Why do some foods have more impacts than others? (e.g., grain or potatoes require soil and water to grow, while beef requires a great deal of grass, grain, and water to grow)

3. What would a web look like for something else we use, like a t-shirt (cotton, dye, packaging, etc.) or a bike (metal, plastic, rubber, etc.)? Emphasize that some products have a much bigger impact than others.

Extension Activity

Have students explain the connections between farming and the food we eat by writing a short story from the point of view of the food. For example, a student could create an autobiography of a hamburger, explaining the resources and steps involved in becoming a hamburger.
Action Projects

- Investigate the food needs in your community. Engage in a project to address those needs by planning a food drive, restocking a local food pantry, or participating in the Great American Bake Sale to end childhood hunger in the United States (visit http://gabs.strength.org).
- Learn more about community garden projects in your area. Students can become advocates for community gardens or plan and develop their own garden at school. The produce that is harvested can be used to make healthy snacks for the class or be donated to a local food pantry. Contact the Center for Ecoliteracy for a free guide to creating a school garden: www.ecoliteracy.org/publications/getting-started.html.
- Third and fourth grade students can buddy up with kids at a local child-care center to share information about local food and environmental issues and serve as positive role models. The older students can develop age-appropriate activities and stories for their younger buddies.

Additional Resources

- For information about agriculture for kids: www.kidsolr.com/science/page2a.html
- To see how everyday objects are made, watch the Show and Tell Series, a 3-part DVD showing how milk and cookies, bats and balls, and news and comics are made.
- For Ecological Footprint lesson plans and activities for primary students, see “Adventures with Bobbie Bigfoot”: www.kidsfootprint.org/index.html
- For more song lyrics or recordings of children’s songs:
  - Wee Sing Silly Songs: http://www.weesing.com/homepage.htm
- Additional children’s stories that demonstrate systems concepts such as Interconnections and Surprising Results:
  - *The Cat in the Hat Comes Back* (Dr. Seuss)
  - *The Old Ladies Who Liked Cats* (Carol Greene)
  - *Who Speaks for Wolf: A Native American Learning Story* (Paula Underwood and Frank Howell)
- For in-depth analysis and teaching of systems concepts through children's stories: *When a Butterfly Sneezes* (Linda Booth Sweeney)
My Food Web
The Green Grass Grows All Around

FOR MIDI AUDIO: http://www.enchbyench.com/angie/green_grass.htm

NOTE: Echo for verses, unison for chorus.

VERSE
There was a hole (There was a hole)
In the middle of the ground (In the middle of the ground)
The prettiest hole (The prettiest hole)
That you ever did see (That you ever did see).

CHORUS
Well, the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And in this hole / there was a root
The prettiest root / that you ever did see
Well the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this root / there was a tree
The prettiest tree / that you ever did see
Well the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this tree / there was a branch
The prettiest branch / that you ever did see
Well the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this branch / there was twig
The prettiest twig / that you ever did see
Well the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And in this nest / there was an egg
The prettiest egg / that you ever did see
Well the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.
And in this egg / there was a bird
The prettiest bird / that you ever did see
Well the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this bird / there was a wing
The prettiest wing / that you ever did see
Well the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this wing / there was a feather
The prettiest feather / that you ever did see
Well the feather on the wing
And the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this feather / there was a flea
The prettiest flea / that you ever did see
Well the flea on the feather
And the feather on the wing
And the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.

And on this flea / there was an elephant
The prettiest little elephant / that you ever did see
Well the elephant on the flea
And the flea on the feather
And the feather on the wing
And the wing on the bird
And the bird on the egg
And the egg in the nest
And the nest on the twig
And the twig on the branch
And the branch on the tree
And the tree on the root
And the root in the hole
And the hole in the ground
And the green grass grew all around all around
And the green grass grew all around.
# Assessment Rubric • Group Food Web

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXCEEDS STANDARD</th>
<th>MEETS STANDARD</th>
<th>BELOW STANDARD</th>
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<tbody>
<tr>
<td><strong>GROUP WORK</strong></td>
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<td><strong>DEMONSTRATES...</strong></td>
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<tr>
<td>Cooperation:</td>
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<td>Members listen to and respect each other.</td>
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<td><strong>Shared responsibility:</strong></td>
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<tr>
<td>Members contribute equally to discussion and poster.</td>
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<tr>
<td><strong>Productivity:</strong></td>
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<tr>
<td>Group stays on task to discuss topic and produce poster.</td>
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<tr>
<td><strong>POSTER</strong></td>
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<tr>
<td><strong>Content:</strong></td>
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<tr>
<td>Shows multiple connections related to food item.</td>
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<td><strong>Craftsmanship:</strong></td>
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<tr>
<td>The central food item image and the parts of the web are clear and readable.</td>
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**Assessment Rubric • Individual Food Web**

**STUDENT: ___________________ FOOD ITEM __________________**

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<td>Correctness: Sentence has proper:</td>
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Overview
Students begin this lesson by singing the Woody Guthrie classic, *This Land Is Your Land*. After a brief discussion of who and what dwells on the land and who the land “belongs to,” students participate in a simulation of ecosystem biodiversity by assuming the identities of plant and animal species in a forest-stream ecosystem. Students establish connections and identify mutual needs in the “circle of life” of this ecosystem, then create a poster with their plant or animal that depicts what/who they depend on and what/who depends on them. Grades K-2 students read Barbara Bash’s *Tree of Life*, a story about the ecosystem surrounding the African Baobab tree. Grades 3-4 read Lynne Cherry’s *A River Ran Wild*, an environmental history for children about the Nashua River ecosystem in Massachusetts, including its pre-colonial state, colonial settlement, industrial development, environmental decline, and eventual restoration. After a discussion of the role of humans in ecosystems, the lesson ends by singing *De Colores*, a Mexican-American folksong that celebrates the diversity of nature in springtime.

Inquiry/Critical Thinking Questions
• How are plants and animals connected to each other?
• What are the special needs of particular species?
• How are plants and animals connected to land and water sources?
• How can humans help keep ecosystems healthy?

Objectives
Students will:
• Question their connections to the land
• Role play and visually display the connections and needs of species in a forest-stream ecosystem
• Understand the importance of biodiversity and the role that humans play in the health of ecosystems

Time Required
2-3 hours

Key Issues/Concepts
• Biodiversity
• Interconnections
• Interdependence
• Food chains

Subject Areas
• Science
• Social Studies
• Language Arts
• Art
• Music
• Foreign Language (Spanish)
National Standards Consistency

Social Studies (NCSS):
- Strand 3 – People, Places, and Environments
- Strand 9 – Global Connections

Science (NCES):
- Content Standard C – Life Sciences
- Content Standard F – Science in Personal and Social Perspectives

FTF Teacher Background Reading

Global Issues and Sustainable Solutions, Chapter 6

Vocabulary
- **Ecosystem**: All of the living and nonliving things in a natural area.
- **Habitat**: The place where an animal lives.
- **Biodiversity**: The variety of life forms in an ecosystem.
- **Food chain**: A series of living things in a community where each consumes a lower member and is consumed by a higher member.
- **Dependence**: Needing or being needed by something else.

Materials/Preparation
- **A River Ran Wild** (Lynne Cherry) OR **Tree of Life: The World of the African Baobab** (Barbara Bash)
- Class set of second page with text from **A River Ran Wild**
- Class set (or overhead transparency) of song, **This Land Is Your Land**
- Class set (or overhead transparency) of song, **De Colores**
- Class set of Ecosystem Identity Cards (1 card for each pair of students)
- Encyclopedias, magazines, or picture books with photos or drawings of stream-forest plants and animals
- Poster paper and colored pencils, crayons, or markers for each student
- Class set of Assessment Rubric
Activities

INTRODUCTION
10 minutes

Have an open discussion by asking:
Where do you live? What kind of land is it?
(Level? Sloped? Hilly? Wet? Dry? Rocky? Plants?) What is your Connection to the land? (Sleep, play, live, etc.) Who owns the land? Who owns nature? (Accept all answers.)

SONG: This Land Is Your Land
(Woody Guthrie)
15 minutes

Background information for the teacher:
Woody Guthrie, one of the United States’ great ballad writers, traveled throughout the country writing songs about identity, belonging, and places. In this song he sings the praises of the country’s vast and diverse landscape and waterways, suggesting that it is our right to enjoy our freedom in this great place. He also suggests that this land “was made for you and me.” Does he mean “ownership” or some other kind of connection to the land?

1. Together (with or without MIDI audio recording or musical accompaniment), sing This Land Is Your Land. Gather the students in a circle and lead them through the song with clapping, stomping, or simple hand/body gestures to go with the lyrics. This will help students learn the lyrics and understand concepts.

2. Ask students: What does this song say about the land in the United States? How does Woody Guthrie feel about the American land? What does he like about our land? What does he like about freedom? What does it mean to say, “This land was made for you and me?” How and why might this be true or not true? What are the different kinds of Connections we can have to the land? (Discuss various possible meanings and issues: ownership, belonging, necessity/survival, recreation, and responsibility.)

3. Ask students: What kinds of Connections do plants and animals have to the land? Where is their home? Does nature belong to them? How? Why?

SIMULATION: Exploring Biodiversity
Connections and Needs
30 minutes

NOTE: This activity can be enhanced by pairing younger and older students across grade levels.

1. Ask students to describe the different roles in a familiar system, such as the school (student, teacher, cooks, custodians, office staff, etc.) or the home (sisters, brothers, parents, relatives, friends, pets, etc.). In these systems, what do different people need from each other? What do they give each other?

2. Explain that, in nature, different places have different types of homes, like the Redwood forests and the desert sands in the song, This Land Is Your Land. Each of these natural places is also called a Habitat or Ecosystem. Ask for
a show of hands from students who have been to a stream in a forest. Ask for volunteers to describe the forest-stream home. What plants and animals make the forest-stream their home? (Students can give general answers, such as trees, bugs, birds, fish, grass, bushes, foxes, raccoons, etc.)

3. Arrange students in pairs. (Mixed grade pairs that pair an older “buddy” will work well, as younger students will need more help in reading and understanding their species role and the task.) Have each pair randomly draw an Ecosystem Identity Card and tell them that it is their job to figure out how the different plants and animals in their forest-stream home live together. Explain that – just like humans – they all need food, water, and shelter.

4. Introduce the vocabulary words listed above.

5. Have each pair try to decide what they eat and where in the forest-stream they live, hide, and sleep. Teachers, aides, or older student “buddies” should help students with the hints on their cards to make sure they understand who/what they depend on and who/what depends on them.

6. Give students about 15 minutes to move about the room with their partner and interview other student pairs to investigate what other plant and animal species live in the forest-stream home and how they depend on each other. Ask them to be ready to provide at least 1 answer to each question on their card: “What/Who do you depend on in the forest-stream home?” and “What/Who depends on you in this forest-stream home?” Students should try to meet as many forest-stream home dwellers as possible and should discover as many Connections and Needs as possible.

7. When the students are walking around meeting the other ecosystem parts, have them act out their plant/animal rather than tell each other what they are. This can be very straightforward - if someone figures out that they are a tree, for example, they could simply say “Yes, I’m a maple tree.”

8. When pairs have discovered what/who they need and what/who needs them, call the class to attention. As a group, discuss the forest-stream home and how it functions. How are the different plant and animal species connected? What do they need from each other? Prompt students to think about food chains. (For example, all of the plants and animals depend on freshwater either directly or indirectly for their survival. Whereas a mayfly may not
rely on a tree directly for its needs, it does depend directly on stream water, which, in turn, depends on trees. Therefore, the mayfly depends indirectly on trees.) As students share their species and connections, write (in as large a size as possible) the ecosystem species on the board and draw arrows between the different species as the connections are stated (i.e., if a species “needs” another species, draw the arrowhead pointing to the species it depends on).

9. Conclude with the following reflection questions:
   • Who/what did you need in the forest-stream habitat? Who/what needed you?
   • Why is it important to have many types of plants and animals in a forest-stream home? (Biodiversity contributes to ecosystem health.)
   • What happens if we remove or damage one member of a forest-stream home? (Model this by referring to the web of connections on the board to show results of disruptions to habitat and food chains.)
   • How might the forest-stream home be affected if a new plant or animal species were introduced? (Food chain disrupted, some species threatened.)
   • How do human beings affect the forest-stream home?

POSTER ART
30 minutes
Tell students that they will each create their own forest-stream home poster for their plant or animal. Read and demonstrate, as needed, all these steps before students begin posters:

1. On 11 x 17 paper (or larger), draw and color your plant or animal in the middle of the poster, leaving plenty of room around it. To help students visualize plants and animals, use the copied second page of text from A River Ran Wild, or other classroom magazines, encyclopedias, or picture books.

2. Around the edges of the poster, list or draw members of the forest-stream home that you depend on and that depend on you.

3. Draw lines with arrowheads pointing to the other members of the forest-stream home that you depend on. Draw lines from other members pointing to you if they depend on you for survival.

4. Leave room at the bottom of your poster for a caption. Your caption
should be 1 or 2 sentences that name your plant or animal and explain its job in the forest-stream home. Why is your plant or animal important? (Example: I am a garter snake. I need the spike rush for my home, and eagles need me for food.)

5. Gallery Walk (when all the posters are finished): Walk around the room to admire classmates' posters.

6. Teacher holds up each poster and students volunteer observations and praise.

STORY
30 minutes
For Grades K-2...
Tree of Life: The World of the African Baobab (Barbara Bash)

Background information for the teacher:
African Bushmen say that in the oldest of times, the careless hyena planted the Baobab tree upside down and that is why its branches are gnarled like roots. Yet, with the coming of seasonal rains twice a year, the Baobab blossoms with life. With colorful and lifelike illustrations, the story shows how these thousand year old trees provide habitat and food for a startling array of creatures that depend on them – and one another – for survival: birds, insects, bats, antelopes, monkeys, reptiles, elephants, and even humans.

1. Before beginning the story, describe the savannah in Africa as vast grasslands dotted with trees, dry except for a brief rainy season. Ask students to name some of the different creatures whose home is the African savannah (small and large mammals, reptiles, insects, birds, etc.). How might these different plants and animals be connected to each other and depend on each other? (For example, as predators and prey or as members of the food chain, as in the forest-stream simulation.) Can you think of
one place in the mostly open land of the savannah where lots of creatures might seek shelter and eat? (Trees!)

2. Read the story aloud, pausing to show the introduction of new species that make a home in or around the Baobab. Ask students to raise their hand when you name a species that might be related to their role in the simulation (e.g., plants, insects, birds, mammals). Pause occasionally to ask students to try to predict what events or images might come next.

3. Discuss the story. What is special about the Baobab tree and why is it such a popular home for the creatures of the savannah? (Size, age, abundant branches, hardiness, leaves, flowers, fruit.) Ask students to identify what/who each creature in the Baobab depends on and what/who depends on them. Help students appreciate the importance of the Baobab in a largely treeless landscape and the importance of the seasonal rains. Just as all the creatures in the forest-stream habitat depend directly or indirectly on the trees and the stream, the creatures in the savannah depend on the Baobab and the rains.

For Grades 3-4...
A River Ran Wild (Lynne Cherry)
Background information for the teacher:
This natural and environmental history of the Nashua River in Massachusetts begins with its pristine state, then its first settlement 7,000 years ago by Algonquin-speaking Indians, followed by English settlement, trading, and finally, industrial development that nearly destroyed the ecosystem. The last portion of the story tells of its revitalization and reclamation as natural habitat and for recreation.

1. Before beginning the story, ask students to start thinking about the different parts of this real forest-stream home and how different plants, animals, and people might be connected to each other and depend on each other.

2. Read the story aloud, pausing on the second page with text to list the Nashua River species that are illustrated and labeled around the margins. Pause occasionally to ask students to try to predict what events or images might come next. Hand out the copy of this page for students to view. Ask students to raise their hand when you name a species that their role in the simulation might be related to. What members of the forest-stream habitat are missing? (Plants, insects, etc.) Finish reading the story.

3. Read the “Author’s Note” at the beginning of the book, which reviews historical facts.

4. Discuss the story. What was the natural Nashua River forest-stream home like before the English arrived? What kind of Biodiversity existed.
there? Describe Connections and Needs of the plants, animals, and Native Americans there. How long were Algonquians living there before the arrival of the English? How did the coming of English settlers and traders mark the beginning of change for the river? (Logging, farming, over-fishing, over-hunting, trapping.) Why did this happen? What happened later to cause great change and harm to the forest-stream home? (Water pollution from textile, pulp, and plastics production.) Why did this happen? What limited the development of industry on the Nashua River? How did things start to change for the better of the Nashua River? How did Marion get people to think about making the Nashua healthier? (By asking them to think about the river’s past, present, and future.) What were some of the healthy changes for the Nashua River? Who or what benefited from these changes?

1. Read Spanish lyrics, line by line, with students echoing each line. Read the English lyrics aloud.

2. Sing *De Colores* together in Spanish, either with student handouts, an overhead, or by ear (with or without musical or audio accompaniment). Gather the students in a circle and lead them through the song with clapping, stomping, or simple hand/body gestures to go with the lyrics. This will help students to both learn the lyrics and understand concepts.

3. Ask students: What is the song about? (Springtime, birds, nature, weather, colors.) What is the feeling or mood of the song? (Happy, celebrative.) What is *De Colores* celebrating? (Life, colors, seasons, different forms of nature.) How are the seasons and creatures in *De Colores* connected? What do they need from each other? What do they need from people?

**Extension Activities**

- Grades 2-4 students can practice writing sentences: 1 sentence about each member of the forest-stream home, including their role, who they depend on, and who depends on them. This is a good vehicle for practicing complex and compound sentences.

- Grades 3-4 students write and illustrate a short story about the forest-stream home or another ecosystem (such as tidelands, a swamp, estuary, desert, savannah, or the Arctic). The story should teach about Connections and Needs for plant and animal species and should have a problem or conflict that gets resolved. Humans might or might not play a role.
**Action Projects**

- **Choose a local ecosystem, maybe even a local park or green space.** Begin by visiting to conduct an ecosystem survey: draw, describe, and then name as many plants and animals as possible. You may find information about species through park agencies, organizations such as the Audubon Society, or through Internet research. Student drawings and descriptions can be compiled into a book to build awareness and appreciation of the area.

- **Choose a local park or green space for service learning.** Find out what public or nonprofit agency manages the area and what type of service projects would be welcomed and useful, including trash cleanup, invasive species and weed eradication, and native plant restoration.

- **Write a letter** (grades 3-4 students as individuals and K-2 students as a class) to a newspaper, public agency, or public official. You may want to describe your service learning experience and your hopes and expectations for official support for biodiversity and the health of a particular ecosystem.

**Additional Resources**

- **For information about ecosystems aimed at primary students,** the Foundation for Global Community offers a 60-second on-line video clip about interdependence on Earth: [http://www.globalcommunity.org/flash/wombat.shtml](http://www.globalcommunity.org/flash/wombat.shtml)

- **For more song lyrics or for recordings of children’s songs:**
  - Wee Sing Silly Songs: [http://www.weesing.com/homepage.htm](http://www.weesing.com/homepage.htm)

- **Additional children's stories that explore ecosystems and demonstrate concepts such as Biodiversity, Connections, and Needs:**
  - *Salmon Stream* (Carol Reed-Jones)
  - *Once a Mouse* (Marcia Brown)
  - *Who Speaks for Wolf: A Native American Learning Story* (Paula Underwood)
  - *This Land Is Your Land* (Woody Guthrie and Kathy Jakobsen)

- **For in-depth analysis and teaching of systems concepts through children's stories:** *When a Butterfly Sneezes* (Linda Booth Sweeney)
This Land Is Your Land
Words and music by Woody Guthrie

For MIDI audio: http://www.smart-central.com/USA/thisland.htm
For lyrics online: http://www.arlo.net/resources/lyrics/this-land.shtml

Chorus:
This land is your land, this land is my land
From California, to the New York Island
From the redwood forest, to the gulf stream waters
This land was made for you and me

As I was walking a ribbon of highway
I saw above me an endless skyway
I saw below me a golden valley
This land was made for you and me

Chorus

I've roamed and rambled and I've followed my footsteps
To the sparkling sands of her diamond deserts
And all around me a voice was sounding
This land was made for you and me

Chorus

The sun comes shining as I was strolling
The wheat fields waving and the dust clouds rolling
The fog was lifting a voice come chanting
This land was made for you and me

Chorus

As I was walkin' - I saw a sign there
And that sign said - no tress passin'
But on the other side .... it didn't say nothin'
Now that side was made for you and me!

Chorus

In the squares of the city - In the shadow of the steeple
Near the relief office - I see my people
And some are grumblin' and some are wonderin'
If this land's still made for you and me.

Chorus (2x)
Ecosystem Identity Cards

HERON
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You like to eat things that swim or crawl in the water.

What/who depends on you in the forest-stream home? Try to find them.
HINT: A certain bug might suck your blood.

RAIN AND STREAM WATER
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You like shade to keep you cool. You also need plants and trees to help create your stream path or channel.

What/who depends on you in the forest-stream home? Try to find them.
HINT: Some things need to swim to live. Others need to hunt in the water.

MAPLE TREE
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You like to drink lots of water. The old, dropped needles from a certain tree can make the soil you grow in richer. So can the droppings from birds and animals.

What/who depends on you in the forest-stream home? Try to find them.
HINT: Some things that swim like their water cool from your shade. Things that fly nest in your branches. Your roots help hold together the soil that makes the channel of the stream.
Ecosystem Identity Cards

**MAYFLY**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You are born in water and you live there for the early part of your life.

What/who depends on you in the forest-stream home? Try to find them.

HINT: Some things that swim with fins or crawl and have pinchers like to eat you.

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**DOUGLAS FIR TREE**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You need to drink lots of water. The fallen leaves from a certain tree and the droppings from birds and animals make the soil you grow in richer.

What/who depends on you in the forest-stream home? Try to find them.

HINT: Something that builds lots of houses likes your wood. Birds nest in your branches. Your roots hold together the soil that shapes the channel of the stream.

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**GARTER SNAKE**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You need to be able to slither and hide in this low-growing plant. You might like to eat something small with wings.

What/who depends on you in the forest-stream home? Try to find them.

HINT: Some things that fly would love to eat you. You may also be eaten by a swimming animal with whiskers and sharp teeth.
Ecosystem Identity Cards

**CRAYFISH**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You need to live where it is very wet. If you get too hot, you die, so find shade.

What/who depends on you in the forest-stream home? Try to find them.
HINT: A big bird that walks in the water loves to eat you. So do two types of animals with claws, teeth, and whiskers.

**HUMMINGBIRD**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You love the sweetness of a flowering plant. You might need to hide in the leaves and branches of two large trees for protection from larger birds who would eat you.

What/who depends on you in the forest-stream home? Try to find them.
HINT: Any plant with flowers needs you to help spread their pollen.

**HONEYSUCKLE BUSH** (shrub typically found along the banks of a forest stream)
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You need a small, quick bird to spread your pollen.

What/who depends on you in the forest-stream home? Try to find them.
HINT: A small, quick bird needs the sweet nectar of your flowers. Your roots keep the soil that creates the stream path or channel from washing away.
Ecosystem Identity Cards

OTTER
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You need water to hunt. You love to eat water creatures that look like shrimp and anything with fins. You like to dig your burrow under the roots of two large trees.

What/who depends on you in the forest-stream home? Try to find them.
HINT: This large animal might like to eat your babies. The fish bones you leave after a meal can make the soil richer for all plants and trees.

MOSQUITO
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You need water to lay eggs in. You love to suck anything with blood.

What/who depends on you in the forest-stream home? Try to find them.
HINT: Anything with fins loves to eat you.

SALMON
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.
HINT: You need to live in water and the water must be cool. Find shade. When you are small you love to eat two types of insects.

What/who depends on you in the forest-stream home? Try to find them.
HINT: Birds and two animals hunt for you. One animal lives mostly on land, the other in water.
**Ecosystem Identity Cards**

**SPIKE RUSH** *(green, grass-like plant growing along shorelines or in shallow water)*

Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You need lots of freshwater to survive. You also need soil that is made richer by fallen leaves and the droppings of animals.

What/who depends on you in the forest-stream home? Try to find them.

HINT: This large bird hunts for small fish where you grow. Two types of flying bugs will lay their eggs around you.

**RAINBOW TROUT**

Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You eat any bugs that live in or around the water. You need cool water. Find shade.

What/who depends on you in the forest-stream home? Try to find them.

HINT: You might be eaten by two types of birds and two types of animals, one that can swim but lives mostly on land, and one that can walk but mostly loves swimming.

**SPOTTED FROG**

Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You need lots of water and shade. You love to eat any bugs.

What/who depends on you in the forest-stream home? Try to find them.

HINT: This animal is a fast swimmer with big teeth. It loves to eat you. There is another, larger, furry, black animal that might also snack on you.
Ecosystem Identity Cards

**EAGLE**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You need to nest in large trees. You eat things that swim.

What/who depends on you in the forest-stream home? Try to find them.

HINT: A certain bug might suck your blood.

**BLACK BEAR**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You love to eat anything with fins on it, or something that crawls without legs. When your back itches you like to find a big tree with rough bark to scratch against.

What/who depends on you in the forest-stream home? Try to find them.

HINT: This very small bug would love to land on your nose and suck your blood. Your droppings make the soil richer for all plants and trees.

**HUMAN**
Think of movements or actions that you and your partner can do to act like this member of the forest-stream home.

What/who do you depend on in the forest-stream home? Try to find them.

HINT: You love to use the wood from trees for homes and furniture. You love to eat things that swim. You can choose to fish for food or fun, but you don’t need to.

What/who depends on you in the forest-stream home? Try to find them.

HINT: Because you have a powerful brain and many tools and weapons, all the animals and plants in the forest-stream home depend on you not to destroy their home.
De Colores
(traditional Mexican-American corrido)
For MIDI audio: http://members.tripod.com/texasmidi/midi.htm#D

De colores, de colores
se visten los campos en la primavera.
De colores, de colores
son los pajarillos que vienen de afuera.
De colores, de colores
es el arco iris que vemos lucir.
Y por eso los grandes amores
de muchos colores me gustan a mi.
Y por eso los grandes amores
de muchos colores me gustan a mi.

Canta el gallo, canta el gallo
con el kiri, kiri, kiri, kiri, kiri.
La gallina, la gallina
con el kara, kara, kara, kara, kara.
Los polluelos, los polluelos
con el pio, pio, pio, pio, pi.
Y por eso los grandes amores
de muchos colores me gustan a mi.
Y por eso los grandes amores
de muchos colores me gustan a mi.

De colores, de colores
brillantes y finos se viste la aurora.
De colores, de colores
son los mil reflejos que el sol atesora.
De colores, de colores
se viste el diamante que vemos lucir.
Y por eso los grandes amores
de muchos colores me gustan a mi.
Y por eso los grandes amores
de muchos colores me gustan a mi.

Of colors, colors
the fields in the spring get dressed.
Of colors, colors
they are the little birds that come from outside.
Of colors, colors
it is the rainbow that we see shine.
And for that reason the great loves
of many colors, they (the colors) please me.
And for that reason the great loves
of many colors, they (the colors) please me.

The rooster sings, sings the rooster
with kiri, kiri, kiri, kiri, kiri.
The hen, the hen
with kara, kara, kara, kara, kara.
The chicks, the chicks
with pio, pio, pio, pio, pi.
And for that reason the great loves
of many colors, they (the colors) please me.
And for that reason the great loves
of many colors, they (the colors) please me.

Of colors, colors
in colors brilliant and fine is clothed the dawn.
Of colors, colors
They are the thousand reflections that the sun hoards.
Of colors, colors
the diamond gets dressed that we see shine.
And for that reason the great loves
of many colors, they (the colors) please me.
And for that reason the great loves
of many colors, they (the colors) please me.
**Assessment Rubric**

**Student Poster Art – Forest-Stream Home**

**STUDENT: __________________________________**

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXCEEDS STANDARD</th>
<th>MEETS STANDARD</th>
<th>BELOW STANDARD</th>
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<tbody>
<tr>
<td>POSTER ART &amp; WEB.</td>
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<tr>
<td><strong>Craftsmanship:</strong></td>
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<tr>
<td>The central image shows sincere effort and the parts of the web are clear and readable.</td>
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<tr>
<td><strong>Content:</strong></td>
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<tr>
<td>Multiple connections accurately show how this species depends upon others, and how others depend upon it.</td>
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<td><strong>CAPTION</strong></td>
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<tr>
<td><strong>Content:</strong></td>
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<tr>
<td>Accurately names and describes the species and its role in the forest-stream ecosystem.</td>
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<tr>
<td><strong>Correctness:</strong></td>
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<tr>
<td>Caption contains correct:</td>
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<td>- Grammar</td>
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<td>- Spelling</td>
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Overview

The class sings *There's a Hole in the Bucket* and *There Was an Old Lady Who Swallowed a Fly* to introduce the systems thinking concepts of *Fixes that Fail* and *Surprising Results*. These concepts are reiterated in a reading of Dr. Seuss's *The Cat in the Hat Comes Back*, in which the Cat in the Hat makes numerous failed attempts to remove pink cat spots.

Students then participate in a systems game called *Bears in the Air*. Given the simple instruction to toss or pass a stuffed bear or other soft object around the group – with the only limitation being that it must change hands in the same order – how fast can they go? Here, students will experience the concepts of *Limits to Success* and *Fixes that Fail*. The game will also introduce *Perspective* via a student(s) who suggests fixes by observing the game from the sidelines.

To identify these principles at work in nature, the class will read 3 children's stories: *Once a Mouse*, a fable in which a hermit transforms a mouse into successively more powerful animals; *Zoom*, a visual journey of changing perspectives; and *Seven Blind Mice*, wherein limited experience limits knowledge. The lesson concludes with an exercise that has students describe or write about a situation (a “system”) in their own life in which they experienced a problem, fixes, and perspective.

Inquiry Questions

- What is a system?
- Why do some fixes to a problem not always work out?
- How can a change in how we see the world provide new ways to solve problems?

Objectives

Students will:

- Identify a variety of systems dynamics and concepts by reading children’s stories and singing children’s songs.
- Experience key systems concepts through a group game and a variety of exercises.
- Either orally or in writing, apply systems thinking to a scenario from their own lives, describing a problem, fixes, perspective, and solutions.

Time Required

2-3 hours

Key Issues/Concepts

- Systems
- Limits to Success
- Fixes that Fail
- Perspective
- Surprising Results
Subject Areas
- Language Arts
- Social Studies
- Science
- Music

National Standards Consistency
Social Studies (NCSS):
- Strand 9 – Global Connections

Science (NCES):
- Content Standard F – Science in Personal and Social Perspectives

FTF Teacher Background Reading
Global Issues and Sustainable Solutions, Chapters 1 and 9

Vocabulary
- System: A group of interacting and interrelated parts forming a complex whole.
- Fixes: Attempts to make something work or perform better.
- Perspective: A point of view; how you see something.

Materials/Preparation
- Class set (or overhead transparencies) of There's a Hole in the Bucket and There Was an Old Lady Who Swallowed a Fly
- The Cat in the Hat Comes Back (Dr. Seuss), Once a Mouse (Marcia Brown), and Zoom (Istvan Banyai) OR Seven Blind Mice (Ed Young)
Activities

INTRODUCTION
10 minutes
Ask students to think of a time when they had difficulty getting better at something (e.g., tying my shoes, handwriting, running, spelling, sports, doing a move on the Monkey Bars, etc.). Call on a few volunteers. Explain that today we will use songs, games, and stories to look into how we solve problems and get better at things.

SONGS
20 minutes
There's a Hole in the Bucket
Background information for the teacher:
In this German folksong, Henry gets lots of advice from Liza about how to fix the hole in his bucket, but each suggestion creates something new to fix. This ends with Henry needing his bucket for water to wet his sharpening stone for the axe to cut the straw to patch his bucket – but there’s a hole in his bucket!
There Was an Old Lady Who Swallowed a Fly

Background information for the teacher:
In this song, an old lady swallowed a fly, then a spider to catch the fly, then a long succession of absurd things to catch the previous thing: bird, cat, dog, goat, minister, rhinoceros, then finally a horse – when “She died of course.”

1. With or without musical or MIDI audio accompaniment, sing *There’s a Hole in the Bucket*, helping students to remember the growing sequence of repetition for each verse. Gather the students in a circle and lead them through the song with clapping, stomping, or simple hand/body gestures to go with the lyrics. This will help students to both learn the lyrics and understand concepts.

2. Define Fixes. (Attempts to make something work or perform better.) Ask for a few volunteers to explain what Henry’s problem was and what the fix was. Why did it fail?

3. With or without musical or audio accompaniment, sing *There Was an Old Lady Who Swallowed a Fly*, helping students with cues to remember the growing sequence of repetition for each verse. Ask for a few volunteers to explain what the problem was and what the fix was.

4. Discuss the 2 songs. Where can we see some Surprising Results (when an attempt to fix something only made it worse)? How, in *There’s a Hole in the Bucket*, did Henry end up where he started? Who had more success – Henry or the old woman? (Henry had help and survived, but did not solve his problem, while the old woman, alone and without help, simply died from her ever-worsening fixes.)

STORY: The Cat in the Hat Comes Back (Dr. Seuss)
20 minutes

Background information for the teacher:
In this Dr. Seuss classic, while Sally and her brother are hard at work shoveling snow, the troublesome Cat in the Hat enjoys some cake in their tub and leaves a pink cat ring. The cat’s successive attempts to clean the pink away only result in spreading it further – from the tub to a dress, shoes, the rug, and the bed. The cat decides he needs help, but when the little and littler helper cats join in, they just spread more pink, and faster! The day is saved by little cat Z’s “Voom” machine, which cleans up all the pink cat spots.

1. Read the story aloud, pausing to emphasize new characters and important events or transitions. Pause occasionally to ask students to try to predict what events or images might come next.

2. Ask for volunteers who can summarize, chronologically, what happened in the story. What happened when the Cat in the Hat tried to clean the pink spot? Why? Why do you think the Voom machine worked? (While the helper cats A-Y only tried more of the same unsuccessful fixes, cat Z had an entirely new approach.) Do Sally and her brother provide any help? (No, they simply watch in frustration.)

3. Ask students to identify Surprising Results and Fixes that Failed in the story.

4. Ask students to try to think of times when someone who wanted to help only made things worse. Point out that this doesn’t mean you shouldn’t try to help; you may just need a new Perspective.
**ACTIVITY: Bears in the Air**

20 minutes

1. Arrange students so they are standing shoulder-to-shoulder in a circle. Stand in the circle with them and show them the stuffed bear or alternate object.

2. Tell students they are going to play a game in which they toss the bear around the circle. There are only 2 rules to the game: (1) Everyone must touch the bear and (2) They must touch it in the same order each time. You only have to remember who gave the bear to you and who you gave the bear to.

3. Have everyone hold their hands out in front so they are ready to catch the bear.

4. Starting with you, gently toss the bear across the circle.

5. Have that person toss the bear to someone else and drop his or her hands after tossing. The last person tosses the bear back to you.

6. Practice at least twice so they are comfortable with the sequence. If students have difficulty catching and throwing with reasonable success, they can walk/run across the circle to pass the bear hand-to-hand.

7. Now tell them you are going to time the activity to see how fast they can do it. You will need to either time it yourself or assign a student to that job.

8. Run the activity and time it. After the first timed run-through, tell students that you are sure they can do it much faster. Run and time the activity a few more times, telling them after each run-through that they can do it even faster. Most likely they will be able to do it faster in the beginning just by tossing faster; however, once they reach a certain level of success, they will not get any faster without a system redesign. In fact, they may even get slower if they get sloppy and toss the bear outside the circle or drop it in their attempt to go faster.

    • **Math connection:** Graph the timed trials so that students can see initial improvement, followed by *Limits to Success* (the graph will appear as a plateau).

9. If students ask if they can do the activity differently, just repeat the rules. They only have to pass (or “touch”) the bear in the same order.

10. To introduce **Perspective**, ask for 1 or 2 students to step outside the group to observe and think about solutions, rather than participate. The goal of this is to see if the additional perspective provided by outside observation creates solutions.

11. Continue until students figure out how to redesign the system to achieve the desired goal. There are several redesigns that will accomplish the task much faster, such as standing next to each other in the proper sequence and passing the bear along the line; having the first person run down the line with the bear to touch each student’s hand in sequence; placing the bear on the floor to be touched in sequence; or lining their hands up vertically in the correct order and cascading the bear down the line. If students have difficulty thinking of fixes, clarify the rules and give them hints without telling them directly how to do it. Praise their ideas and progress.
12. Conclude with the following reflection questions:

- What happened the first few times you were timed? Did you succeed in going faster? Why did you reach a point when your speed didn’t improve? (*Limits to Success are normal!*)
- How did you think of a new approach? Which approach was the most fun?
- Did anyone offer a solution that was ignored? Why was their solution ignored?
- Did the student observer – watching and not participating – help find solutions? Why or why not?
- What are some examples of times when, like the Cat in the Hat, you experienced *Limits to Success* by doing something harder or faster? How did you come up with new solutions?

**STORIES**

20 minutes each

*Once a Mouse* (Marcia Brown)

Background information for the teacher:

This animal fable from ancient India is part of a collection of fairy tales and fables called the *Hitopadesa* (written between A.D. 400 and A.D. 1100). A hermit with magical powers sits thinking about things both large and small. When he sees a crow about to grab a mouse, he decides to help the mouse by scaring away the crow. Then, when the mouse is threatened by a cat, the hermit turns the mouse into a bigger cat, and then into a big dog and a ferocious tiger when threats come from these
animals. When the powerful tiger becomes vain and ungrateful, the hermit turns it back into a mouse, leaving the hermit to further ponder big and little.

1. Read this very short story aloud, showing each woodcut illustration. Pause occasionally to ask students to try to predict what events or images might come next.

2. Ask students: What happens in this story? What do you guess was on the hermit’s mind when he was thinking about big and little? Why did the hermit decide to help the mouse? Why did the hermit decide to turn the tiger back into a mouse? Is “bigger always better?” Why or why not? What were some of the Fixes that Failed and Surprising Results? Can you think of a time when someone’s attempt to help somebody else failed?

Zoom (Istvan Banyai)

Background information for the teacher:

There are no words in this unusual and purely visual story. The viewer’s frame of reference, or Perspective, gradually pulls back from the first close-up image of a rooster’s comb. Continually revealing new settings and contexts, and surprising, unexpected perspectives, the frame ends with a view of Earth from space.

1. Share this very short visual story, including every essential image in sequence. Pause occasionally to ask students to try to predict what image might come next.

2. Ask the students to recall surprising changes. Why were you surprised? (This is called Perspective.) What does our perspective help us to do? (It helps us focus on an existing problem.) How can our perspective limit us? (By keeping us from seeing or imagining the “big picture” or new fixes.)

3. Demonstrate Perspective. Ask kids to create a frame (their “perspective”) by touching their first (index) finger to the thumb of the same hand. Hold this circle out at arm’s length and look through it with one eye, closing your other eye. Focus on an object across the room. Now bring the circle frame halfway to your eye, then all the way to your eye.

4. Ask students: What did you see through the circle when it was far away? Halfway toward you? Next to your eye? How can a change in our perspective change what we see? What kinds of frames can help us see things differently? Why are these frames useful?

Seven Blind Mice (Ed Young)

Background information for the teacher:

In this remake of a classic Hindu fable, one by one, seven blind mice investigate an elephant by a pond. “It’s a pillar,” says one. “It’s a fan,” says another. Having explored different parts of the elephant (tusk, tail, ear, foot, etc.), each comes back with a different theory about the strange Something by the pond. Only when the seventh mouse goes out – and explores the whole Something – do the mice see the whole truth.

1. Read the short story, perhaps with different students each reading one of the seven mouse sections. Pause occasionally to ask students to try to predict what events or images might come next.

2. Ask the students to summarize the story. What were the mice exploring?
Why did they have different experiences? How did the last mouse figure out it was an elephant? (Only the last mouse had the perspective of exploring the entire elephant.)

3. If the class has not completed the *Perspective* exercise listed under *Zoom* above, do so here. Demonstrate *Perspective*. Ask kids to create a frame (their "perspective") by touching their first (index) finger to the thumb of the same hand. Hold this circle out at arm's length and look through it, focusing on an object across the room. Now bring the circle frame halfway to your eye, then all the way to your eye.

4. Alternatively, blindfold 3-5 students. Have the rest of the class observe as you pass around a common classroom object (stapler, globe, coffee mug, watch, stuffed animal) for each blindfolded student to touch — but hold it for each student so that each only touches one part of the object. Allow the last blindfolded student to handle the entire object. Have the blindfolded students wait until everyone has touched the object before they start volunteering guesses about what the object is. Why do they have different guesses? (Like the blind mice who only explored part of the elephant, all but the last were only able to explore part of the object.)

5. How does it affect us to only know part of something? How can this limit our success? Give real-life examples of how limited knowledge limits success or experience (e.g., not knowing all the rules to a game, not knowing the entire alphabet, knowing only parts of the multiplication tables, not knowing all the trails in a park, not knowing your classmates’ names, etc.).
ACTIVITY: Problems and Fixes in My Life
30 minutes

1. Tell students that you want to know how well they can tell others (or for older students, write) about a problem and fixes in their life.

2. Model the exercise by reading aloud the sample paragraph below, naming the Parts of the System (ALL CAPS) as you read.

My Printing Problem

DESCRIBE PROBLEM: I have always had bad handwriting. My teachers and friends said that my printing is like chicken scratches.

LIMITS TO SUCCESS: My handwriting did not get better from first to second grade. Getting older and smarter and getting bigger hands did not help.

FIXES THAT FAIL: When I tried to hold my pencil tighter my handwriting got worse. Writing slower did not help. Writing faster did not help. Writing larger or smaller did not help. When I got mad about this, my handwriting became even worse.

SURPRISING RESULTS: Once my handwriting was so bad that my teacher made me do it again and my parents would not let me play computer games for a week.

PERSPECTIVE, SOLUTIONS: Then, my third grade teacher helped me to hold the pencil differently between my thumb and two fingers. Now my printing is a little bit better, and I am also learning how to write in cursive.

3. Ask students to verbally describe a problem and how they fixed it.

Encourage them to think about and express some of the ideas learned in the lesson, such as Limits to Success, Fixes that Fail, and Perspective. Students do not need to name the concepts; it is more important that they demonstrate their understanding through concrete examples.

4. For older (grade 3-4) students you can have them write about their problem using the handout, Problems and Fixes in My Life, as a guide. Read through the handout directions with students. Have them brainstorm other possible problems aloud.

5. For written work you can use the Assessment Rubric.

Extension Activity

Have students choose a “system” that they think is not working well. This could be something going on at home, in their school, in their community, or in the larger world. Have them discuss, research, and/or write about the system using the Bears in the Air activity as a model. They should identify and explore their goals, problems, and possible solutions. For example, the classroom needs to be cleaned up after art activities, but what happens if no jobs or responsibilities are assigned? What fixes might work?

Action Project

Explore the topics of reading and writing and how they affect other areas of our lives. Students can plan a book drive, make bookmarks or picture books for a local community center or a sister school in another country, and/or read books to younger “reading buddies” in another class.
**Additional Resources**

- Other children’s stories that demonstrate systems concepts used in this lesson:
  - *If You Give a Mouse a Cookie* (Laura Numeroff)
  - *The Old Lady Who Liked Cats* (Carol Greene)
  - *The Sneetches and Other Stories* (Dr. Seuss)
  - *The Lorax* (Dr. Seuss)
  - *Anno’s Magic Seeds* (Mitsumasa Anno)
  - *A River Ran Wild* (Lynne Cherry)

- For in-depth analysis and teaching of systems concepts through children’s stories: *When a Butterfly Sneezes* (Linda Booth Sweeney)

- For more song lyrics or for recordings of children’s songs:
  - Wee Sing Silly Songs: [http://www.weesing.com/homepage.htm](http://www.weesing.com/homepage.htm)


- To see perspective change as you decrease distance from an object by powers of 10, visit *Secret Worlds: The Universe Within* on the Molecular Expressions website: [http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html](http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html)
There Was an Old Lady Who Swallowed a Fly

For MIDI audio: http://www.niehs.nih.gov/kids/lyrics/oldlady.htm

I know an old lady
She swallowed a fly
But I don't know why
She swallowed the fly

- I guess she'll die

I know an old lady
Who swallowed a cat
Just imagine that
She swallowed a cat
She swallowed the cat
To catch the bird
She swallowed the bird
To catch the spider
Who wiggled and jiggled
And tickled inside her
And she swallowed the spider
To catch the fly
But I don't know why
She swallowed the fly

- I guess she'll die!

I know an old lady who swallowed a dog
Ooh, what a hog
She swallowed a dog
She swallowed the dog
To catch the cat
She swallowed the cat
To catch the bird
And she swallowed the bird
To catch the spider
Who wiggled and jiggled
And tickled inside her
And she swallowed the spider
To catch the fly
But I don't know why
She swallowed the fly

- I guess she'll die
I know an old lady
Who swallowed a goat
She just opened her throat
And swallowed a goat
She swallowed the goat
To catch the dog
She swallowed the dog
To catch the cat
She swallowed the cat
To catch the bird
And she swallowed the bird
To catch the spider
Who wiggled and jigged
And tickled inside her
And she swallowed the spider
To catch the fly
But I don’t know why
She swallowed the fly

- I guess she’ll die

I know an old lady
Who swallowed a minister
Isn’t that sinister?
To swallow a minister
She swallowed the minister
To catch the goat
And she swallowed a goat
To catch the dog
And she swallowed a dog
To catch the cat
She swallowed the cat
To catch the bird
And she swallowed the bird
To catch the spider
That wiggled and jigged
And tickled inside her
And she swallowed the spider
To catch the fly
But I don’t know why
She swallowed the fly

- I guess she’ll die!

I know an old lady
Who swallowed a horse...
She’s dead of course!
There’s a Hole in the Bucket
Writer Unknown

There’s a hole in the bucket,
Dear Liza, dear Liza
There’s a hole in the bucket,
Dear Liza, a hole.

Then fix it, dear Henry,
Dear Henry, dear Henry
Then fix it, dear Henry,
Dear Henry, fix it.

With what shall I fix it,
Dear Liza, dear Liza?
With what shall I fix it,
Dear Liza, with what?

With a straw, dear Henry,
Dear Henry, dear Henry
With a straw, dear Henry,
Dear Henry, a straw.

But the straw is too long,
Dear Liza, dear Liza
But the straw is too long,
Dear Liza, too long.

Then cut it, dear Henry,
Dear Henry, dear Henry
Then cut it, dear Henry,
Dear Henry, cut it.

With what shall I cut it,
Dear Liza, dear Liza?
With what shall I cut it,
Dear Liza, with what?

With an axe, dear Henry,
Dear Henry, dear Henry
With an axe, dear Henry,
Dear Henry, an axe.

The axe is too dull,
Dear Liza, dear Liza
The axe is too dull,
Dear Liza, too dull.

Then sharpen it, dear Henry,
Dear Henry, dear Henry
Then sharpen it, dear Henry,
Dear Henry, sharpen it.

With what shall I sharpen it,
Dear Liza, dear Liza?
With what shall I sharpen it,
Dear Liza, with what?

With a stone, dear Henry,
Dear Henry, dear Henry
With a stone, dear Henry,
Dear Henry, a stone.

The stone is too dry,
Dear Liza, dear Liza
The stone is too dry,
Dear Liza, too dry.

Then wet it, dear Henry,
Dear Henry, dear Henry
Then wet it, dear Henry,
Dear Henry, wet it.
Problems and Fixes in My Life

NAME ________________________________

DIRECTIONS: You will write a paragraph to share with the class about a time when you experienced a problem that you tried to fix. Begin by describing the problem (some ideas are listed below). Then try to comment on as many parts of the situation as you can. Before you write your paragraph, try answering the questions below to help you think of ideas.

POSSIBLE PROBLEMS:
Tying my shoes
Handwriting
Spelling
Sports (kickball, baseball, soccer...)
Drawing
Cleaning my room

Finishing my homework
Training my dog
Learning to ride a bike (or scooter)
Jumping rope
Cooking or making __________________

MY PROBLEM AND SOLUTION:

What was the problem you were trying to solve?

________________________________________________________________________

What made it hard to do?

________________________________________________________________________

At first, what did you try to do to get better?

________________________________________________________________________

What happened when you tried to get better at the problem?

________________________________________________________________________

How did you figure out what you were doing wrong? Did you get help?

________________________________________________________________________

________________________________________________________________________

What was your final "fix"? How successful were you at solving the problem?

________________________________________________________________________

________________________________________________________________________
# Assessment Rubric • Written Response to Systems Scenario

**STUDENT:** __________________________

**SCENARIO/PROBLEM:** __________________________________________

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>EXCEEDS STANDARD</th>
<th>MEETS STANDARD</th>
<th>BELOW STANDARD</th>
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<tbody>
<tr>
<td><strong>THE PROBLEM</strong></td>
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<tr>
<td>Problem is clearly described.</td>
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<td>Limits to Success identified.</td>
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<td><strong>FAILED FIXES</strong></td>
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<td>Describes Failed Fixes.</td>
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<tr>
<td>Describes Surprising Results (if any).</td>
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<tr>
<td><strong>SOLUTIONS</strong></td>
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<td>Identifies Perspective.</td>
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<td>Describes successful Solution (or the current state of the problem).</td>
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<td><strong>DELIVERY (oral)</strong></td>
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<td>Speaker is:</td>
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<td>• Audible</td>
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<td>• Clear</td>
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<td>• Engaging</td>
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<td><strong>CORRECTNESS (written)</strong></td>
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<td>Paragraph contains correct:</td>
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<tr>
<td>• Grammar</td>
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<td>• Punctuation</td>
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<td>• Spelling</td>
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Teaching Global Sustainability in the Primary Grades
A K-4 Curriculum Guide

About this book...

Global Sustainability
- concepts explored include:
  - identity and culture
  - human connections to the environment
  - biodiversity
  - systems dynamics

Interdisciplinary
- Subject areas include:
  - social studies
  - science
  - language arts
  - music
  - art

Student Engagement
- Fun, interactive lessons include:
  - role plays
  - simulations
  - singing
  - art
  - children's stories
  - written and spoken exercises
  - individual and group activities

Standards-Based
- Aligned with national content standards:
  - National Council for the Social Studies
  - National Science Education Standards

Service Learning
- Action opportunities are provided for students to make positive contributions, both locally and globally.

Field Tested
- All lessons have been reviewed and field tested by content experts, teachers, and students.

Lessons & Objectives

Map of Myself: Identity and Culture
- Explore personal and cultural identity through group activity, songs, map making, and stories read aloud.
- Create a map that expresses personal and cultural identity.

Connections All Around: Me, My Food, and My Environment
- Identify connections among our food, our lives, and our environment.
- Visually display what it takes to bring an everyday food item to our table.

Woods, Water, and Wild Things: Biodiversity in the Forest-Stream Habitat
- Role-play and visually display the connections and needs of species in a forest-stream ecosystem.
- Understand the importance of biodiversity and the role that humans play in the health of ecosystems.

Systems: Problems and Fixes
- Experience key systems concepts such as perspectives and solutions through a group game and a variety of other activities.
- Either orally or in writing, students apply systems thinking to a scenario from their own lives.