



Natural Resources

Unit Overview

This unit focuses on natural resources as they relate to sustainable development. It is appropriate for Grades K – 4. It is the goal of the unit to have students increase their understanding of natural resources use, depletion, and biodiversity. This unit and “The Life History of Stuff” unit both cover some important aspects of natural resources and sustainable development and work well together.



Using the Unit

This unit contains three lessons, each with specific objectives and learning outcomes. Additional activities are provided in the enrichment part of each section. Simple examples of the basic concepts of sustainable development and natural resources are given for younger students. More mature concepts are introduced in the later lesson. The culminating activity is a case-problem on settling an undeveloped island using sustainable practices. Students are encouraged to think creatively. Students will evaluate the tradeoffs of various decisions and determine the best outcome. They will discuss the probable consequences of each decision.

The case begins with a presentation of the problem and includes important facts and background information. Instructors may add additional facts and details to what is provided with the unit. Students wishing to do additional research to enhance their knowledge and create more-informed solutions will find the list of websites, articles and other publications helpful. Student teams analyze the likely consequences of their development plan. They will examine the economic, ecological and social aspects of their choices. Students will make a presentation to the class detailing why they made the choices they did and what were the likely consequence of their decisions. These presentations provide a creative way to assess learning outcomes. The case-problem can be used with a larger unit of study on Jamestown—a community that was not developed in a sustainable manner.

Unit Context

In terms of our Soft vs Hard Green Framework (see Chapter 2), Soft Green enthusiasts advocate reliance on “first dimensional environmental income” from renewable energy sources at the earth’s surface: solar, wind, water, biomass, hydrogen, etc. Hard Green supporters urge reliance on “third dimensional environmental capital” from nonrenewable energy sources that lie deep underground: fossil fuels, uranium, etc.

LESSON 1

Raw from the Earth

Everything humans use in their physical environment to meet their needs and wants come from natural resources supplied by the earth and sun. Students will define natural resources, list and categorize examples, and make their own picture booklet of natural resources.

Nat. Res.

Objectives:

In this lesson students will:

- U **Define natural resources**
- U **Categorize examples of natural resources**
- U **Discuss the use of natural resources**



Standards of Learning:

Math K.16, 1.18; Science K.10, 1.8; Social Studies K.6, 1.9

Skills:

Defining
Categorizing
Comparing
Concluding

Key Terms / Concepts:

Natural Resources
Raw Materials
Differences
Similarities

Supplies 	You Will Need <ul style="list-style-type: none">• Manila Folders• Paper• Poster Board• Pictures of Natural Resources
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Background:

Natural resources are the raw materials supplied by the earth and its processes and include things in the physical environment used for housing, clothing, heating, cooling, transportation and to meet other human wants and needs. For example, trees are used for shelter, animals for food and clothing, plants for medicine, minerals and fossil fuels for power, transportation, heating and cooling. These resources include soil, air, water, sunshine, forests, wildlife, fish, fossil fuels, metals and minerals produced by the earth's natural processes. Using natural resources to meet human needs and wants has an impact on the global environment. Each time raw materials are used to produce goods, there are ecological, social, and economic impacts. Managing these natural resources and utilizing conservation techniques is necessary to help societies meet present and future needs. The primary economic value of a matured resource derives from the services it provides humans.

Getting Ready:

Make an overhead transparency and copies for each student of the Natural Resources page (NR 1) and the matching activity (NR 2). Prepare the manila file folders and paper for the student booklets by stapling full size sheets of unlined paper within the folder. Collect and laminate pictures of various natural resources from such nature magazines as Natural Geographic, Ranger Rick, Nature Conservancy, or Virginia Wildlife. Make and attach four signs on the bulletin board: FOREST RESOURCES, WATER RESOURCES, ENERGY RESOURCES and MINERAL RESOURCES. Students will pin their pictures under the proper category.

Procedure:

Part 1

1. **Pass out the Natural Resources page (NR 1) depicting a scene in nature.** Using the overhead, ask students to describe the scene. As they list each of the living items in the picture, write the name of the item on the overhead. Have students write the same words next to the item on their sheets.

2. **Tell students the living things in the picture are called natural resources.** They are the raw materials from the earth people use to make things they need and want. Ask students to decide how the natural resources in the picture could be used. (For example, the tree could be used for cooking fuel or building homes).

3. **Ask students what other natural resources could be added to the picture to meet human wants and needs.** Possible answers might include other animals and fish, minerals, or fossil fuels such as oil or coal. Have students color their scenes. Older students draw additional natural resources in the picture.

4. **Complete the activity by asking students to imagine what would happen to the living things in the scene if the trees were cut down or the pond was drained.** The discussion should not only include the birds, squirrels, insects and other animals, but also how other plant life in the habitat would be affected.

5. **Point out to students that living things depend on each other to survive.** We need raw materials from nature. Discuss the ecological, social, and economic repercussions of cutting down the trees or draining the pond. (For example, some of the ecological effects of cutting the trees are that it eliminates the homes of birds and squirrels, reduces the shade raising the temperature of the pond water, and reduces the air cleaning qualities of trees. However, if the tree were diseased, it would be beneficial to the environment if it were removed. When cut, the tree could provide economical benefits if the wood is made into a useful product that is sold. The social effects might include the loss of a beautiful tree, a less attractive site, but one with more space to run and play.)

Part 2

6. **Pass out pictures of natural resources to students.** Ask students to attach the picture of natural resource they have under one of the four categories: forest resources, water resources, mineral resources or energy resources.

7. **Ask the students what can be made from natural resources they are categorizing.**

8. **Pass out the matching activity worksheet (NR 2).** Using the overhead of the matching activity, illustrate to students how they should draw a line between the natural resource and the product made from it by connecting the dotted line. Have students connect the dotted line between the plants and the picture of medicine on their worksheets. Tell students there are many medicines that are made from the leaves, fruits and bark of plants and trees. Have students complete the worksheet.

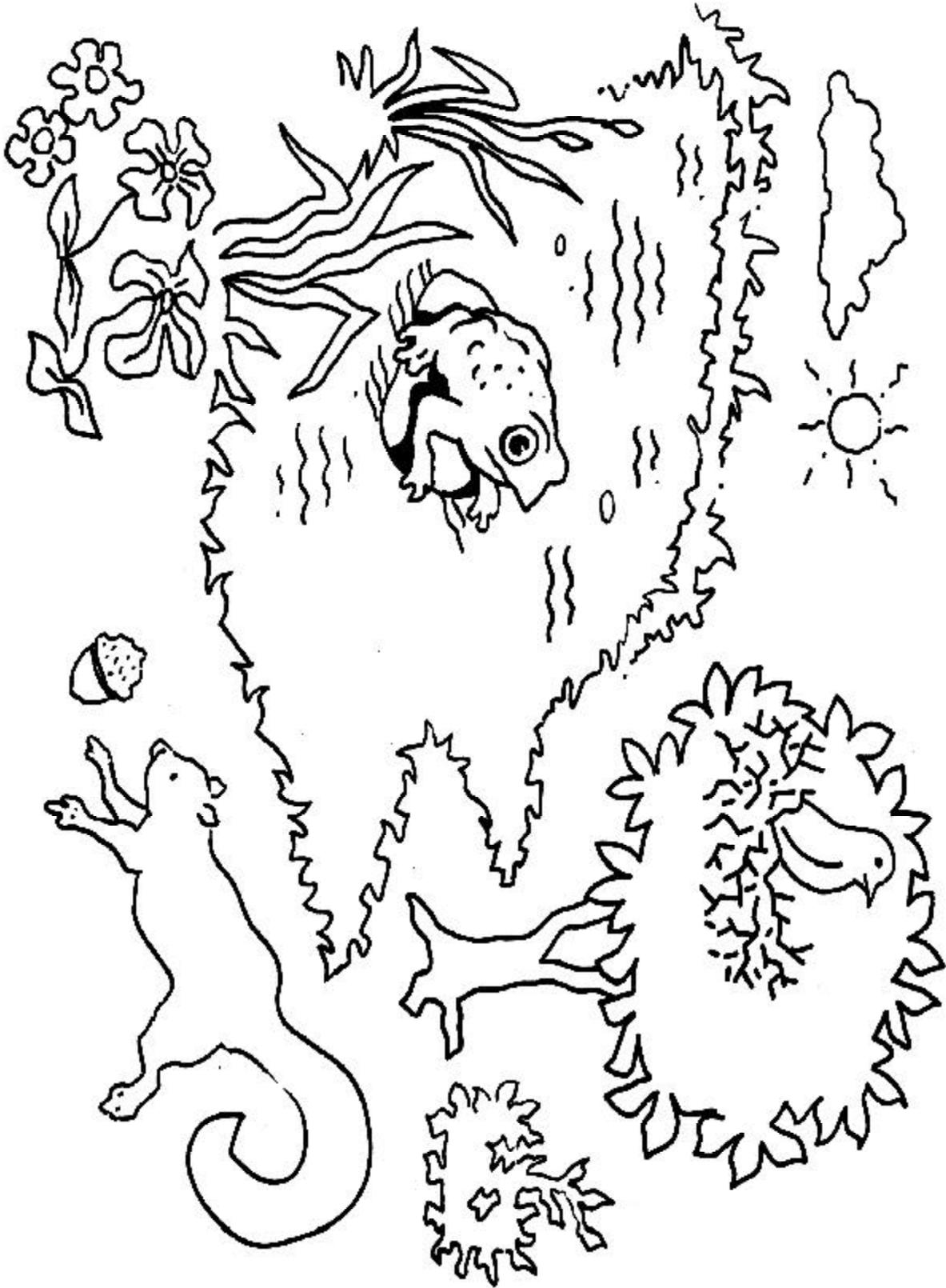
9. Complete the activity by having students make a booklet entitled “My Natural Resource Book.” Younger students: cut pictures from the magazines and glue them in the booklet. Older students: draw their own pictures of the natural resources and write simple narratives to go with the drawings.

Enrichment:

1. Make a wreath or wall decoration using natural materials such as leaves, pinecones, flowers, branches, and other natural materials. Show students the wreath and discuss the natural resources used to make it. Have students make their own wreath, bird feeder, or wall decoration.
2. Fill a grocery bag with a variety of household items. Possible items include a cotton ball, popsicle stick, knit hat, pencil, shoelace, apple. Have students select an item from the bag and identify the natural resource used to make it. Expand the activity to an interactive bulletin board with the articles attached to the natural resources used in Activity 2.
3. Have students write a story with illustrations about the natural scene picture using the scenario of the tree is cut down or the pond is drained.

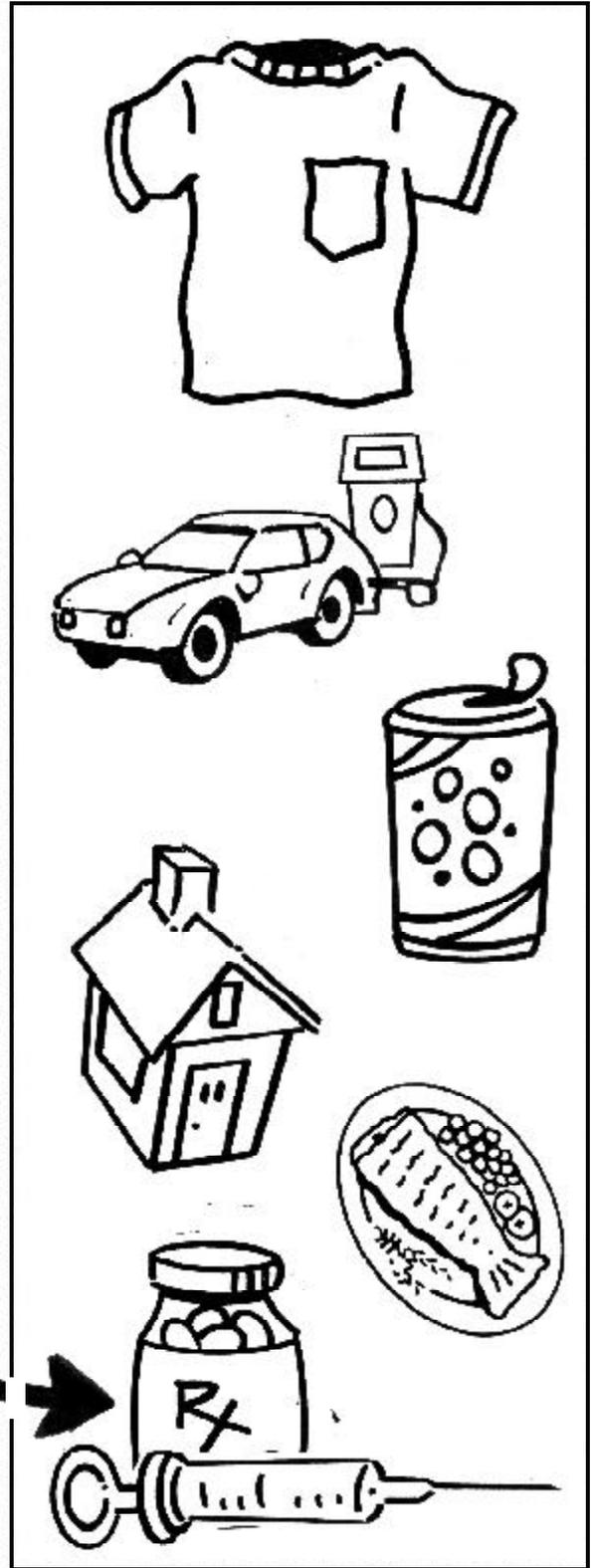
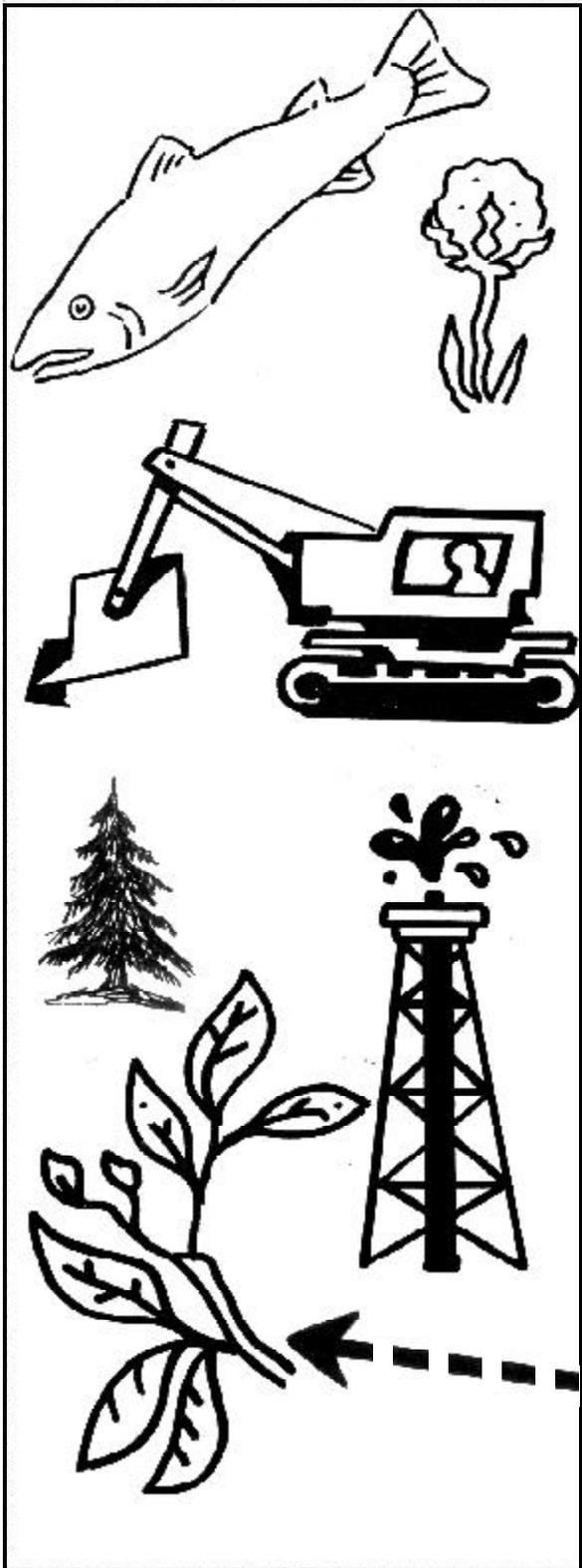
Assessment:

1. Determine if the student can define and identify natural resources by evaluating their answers to questions.
2. Evaluate the ability of students to match natural resources into four categories.
3. Assess student ability to make connections between the dependence of humans on natural resources and the ability to survive by their responses to “what if...” scenarios.



Natural Resources and Their Products

Match the natural resource with the product they make.



Nat. Res.

LESSON 2

Naturally Sustainable... or Not

Students will learn what the terms renewable, nonrenewable and perpetual natural resources mean. They also will discuss why it is important to use natural resources in a sustainable way.

Nat. Res.

Objectives:

In this lesson students will:

- U Define sustainable yield and renewable, nonrenewable and perpetual natural resources
- U Categorize examples of natural resources
- U Discuss resource depletion and sustainable



Standards of Learning:

Science 2.5, 3.6, 3.7, 3.10, 3.11; Social Studies 2.6

Skills:

Defining
Categorizing
Discussing
Comparing
Summarizing

Key Terms / Concepts:

Sustainable Yield
Perpetual Resources
Renewable Resources
Non-Renewable Resources
Resource Management
Conservation
Resource Depletion

Supplies 	You Will Need <ul style="list-style-type: none"> • Posters • Magazines • Index Cards • Tacks • 4 Paper Bags • Drawing Supplies • Poster Board
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Background:

Natural Resources are the raw materials supplied by the earth and its processes. There are three main categories of natural resources: perpetual, renewable and non-renewable:

- Perpetual resources are those expected to last many billions of years without being depleted, such as solar energy, wind, or ocean tides.
- Renewable resources are those that have the potential to be renewed through natural processes and/or human processes. Trees are an example of a renewable resource because, although trees die naturally or are harvested, new trees can be replanted or allowed to reseed naturally. They can be renewed both naturally and through forest management practices. (Other examples include groundwater, fisheries resources and soil nutrients.) Renewable resources must be managed properly to be sustainable for future generations, i.e., people should not consume natural resources faster than nature can replenish the supply. Although various management practices can be used to ensure that a resource will renew itself, there is a maximum rate at which the resource can be used by people. That rate is called “sustainable yield.” One well-know example of overuse of a natural resource beyond the rate it could be renewed is the passenger pigeon. In the early 1900s, the bird was hunted so heavily for food and feathers that it could not sustain the overuse and became extinct.
- Nonrenewable resources are exhaustible and can be depleted. There is a limited quantity and once used, cannot be replaced in this geologic age. Fossil fuels are an example of a resource formed over millions of years, and it will be millions of years before it is again available. Other natural resources with finite amounts include copper, gold, aluminum and many minerals and gems. Managing these natural resources and using conservation technologies can help society maintain and extend the time these resources can be used to meet human needs and wants.

Getting Ready:

Collect posters, cards and magazines such as Natural Geographic, Ranger Rick, Nature Conservancy, or Virginia Wildlife with pictures of natural resources. Make four signs from poster board: RENEWABLE RESOURCES, NONRENEWABLE RESOURCES, PERPETUAL RESOURCES, and NO LONGER RENEWABLE RESOURCES. Students will pin their pictures under the proper category. Some possible examples might include salmon, sand, wind, hot springs, tides, minerals, coal, oil, natural gas. Be sure to include some extinct species such as the dinosaurs, and the Carrier pigeon. On index cards write the name of some natural resources not depicted in the magazines. Put one resource on each card and divide them among the four paper bags.

Make a copy of the Story Starters page (NR 3) for Activity 2. Cut apart and attach to cardstock.

Procedure:

Part 1

1. **Attach the three signs renewable resource, nonrenewable resource, and perpetual resource to the bulletin.** Leave room for the fourth sign, no longer renewable resource, but do not attach it until the end of the discussion.
2. **Review with students the definition of natural resources and explain the differences among the three categories.** Explain that not all natural resources can be replaced naturally or by human activities. Some of the resources are available in limited amounts and will take millions of years to be replenished. Tell students that some renewable and some non-renewable resources can be recycled into the same or new products such as aluminum cans.
3. **Ask students to give examples of different types of resources.**
4. **Have students cut out pictures of natural resources from posters, cards, and magazines.** Collect the pictures and divide them among four paper bags.
5. **Divide the class into four teams and give each one a paper bag with the pictures and cards in them.** Have the teams decide which ones are renewable, nonrenewable and perpetual. Tell students they must all agree on the category selected. Have each team pin the items on the bulletin board under the category selected.
6. **Discuss their selections and give them a point for each natural resource correctly categorized.**
7. **Attach the No Longer Renewable Resources sign and ask students how might a renewable resource become non-renewable.** Ask students if any of the resources on the bulletin board need to be moved under this new label. Students should recognize that extinct species are in this category. During the discussion, introduce the idea of sustainable yield and resource depletion. Ask students how each of the resources can be used in a sustainable way.
8. **Select several items in the classroom.** Have students identify various natural resources used to make the item. *For example, a chair might have a wood seat made from a tree or plastic seat made from oil, metal bars, screws or rivets made from minerals, and rubber pads on the legs from a rubber tree.* Identify which of these resources is renewable or non-renewable.

9. As they discuss natural resources used in the product, write each one on an index card. Also identify the fuel or energy sources used to make the items selected. Have students place these cards under the categories on the bulletin board.

10. Discuss with students the natural resources they use every day that are necessary for survival. They might suggest energy resources for heat and power, food for basic survival, materials for clothing, and other important resources such as wood for shelter.

11. Have students list the resources they need. Then list the resources used each day only because they want them. Finally, have students list the resources they think they might use in the future.

Part 2

1. Discuss with students how dependant each of them is on a variety of natural resources. If this activity is done on a second day, review the discussion points from Activity 1.

2. Explain to students that they are going to write a story about natural resources as a team. The team will generate ideas and one member will record them.

3. Using one of the story starters or one you have made up, discuss with students how they might finish the story. Discuss some of the consequences of their endings. Include environmental, social and economic consequences in the discussion.

4. Pass out the story starters. Give each team time to write their story. Remind students to give their story a title.

5. Conclude the activity by teams sharing their story. Discuss the consequences of the decisions each team made.

Enrichment:

1. Have students illustrate their stories. Collect and make enough copies of each story for each student. Have students compile the stories into a booklet with a cover depicting some of the natural resources.

2. Have students turn their stories into a skit they can present to other classes.

3. Have students write a paper about the energy sources, and the advantages and disadvantages used in the manufacturing process of one of the items in Activity 1.

4. Have students research the natural resources needed for survival, the role of natural resources in the environment, and how their use by society impacts their habitat. Create a list or draw a web of the interactions of these resources with the other plants and animals in a habitat.

Assessment:

1. Determine if students can accurately select pictures of natural resources and define the four categories by scoring their correct answers.
2. Evaluate the ability of the student to match the natural resources with the correct category by giving points for accurate answers.
3. Assess student ability to make the connection between the use of natural resources in a sustainable way and the consequences of those actions by evaluating their discussion responses and their stories.

STORY STARTERS.....

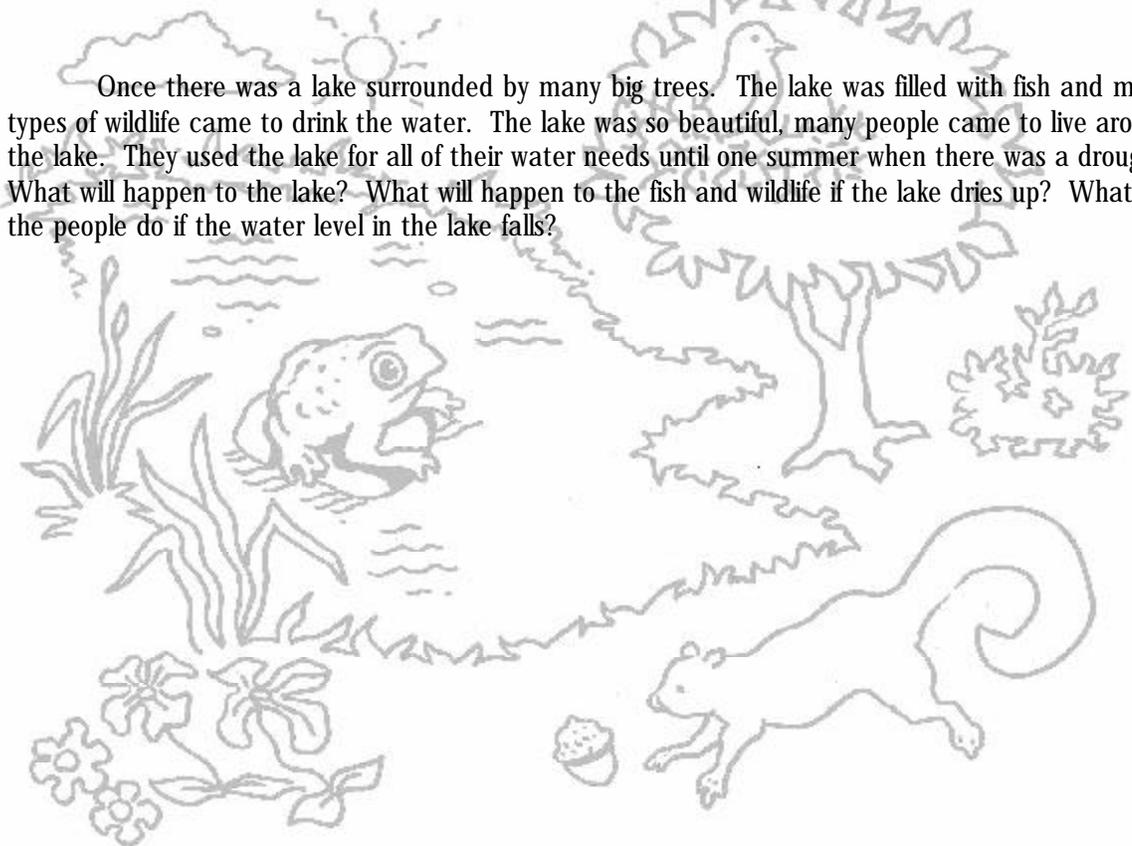
One day you went fishing in a small pond and caught a very nice fish. You took the fish to your Grandmother, who cooked it for dinner. You had so much fun catching that fish, you took all of your classmates to the pond to fish. Do you think there will be enough fish for everyone? What do you think will happen to the other aquatic life in the pond if you catch all of the fish?

You find a plant with a beautiful flower and you decide to pick the flower and take it to your Mother. Your Mother thanks you for the flower and tells you it is from a very rare plant used to make medicine. What will happen to the plant now that you have picked the flower? What would happen if there are no other plants like this one that can be used to make medicine?

One day during recess you see a beautiful caterpillar. You catch the caterpillar, put it into a jar, and take it back to the classroom. What do you think will happen to the caterpillar? What would happen if everyone in your class caught a caterpillar?

One fall day your class goes for a walk in the woods. There are many acorns on the ground. You and your classmates, collect all you can find and bring them back to school. What will happen to the forests if there are no acorns? What will happen to the deer who like to eat acorns?

Once there was a lake surrounded by many big trees. The lake was filled with fish and many types of wildlife came to drink the water. The lake was so beautiful, many people came to live around the lake. They used the lake for all of their water needs until one summer when there was a drought. What will happen to the lake? What will happen to the fish and wildlife if the lake dries up? What will the people do if the water level in the lake falls?



LESSON 3

Bare Necessities: Food and Drink for All

Using natural resources to meet society's wants and needs requires wise management and stewardship of the resources. How wisely society develops the land and the impacts on natural resources will determine what is available in the future. Students will decide how to settle an undeveloped island while preserving the maximum amount of natural resources.

Objectives:

In this lesson students will:

- U Identify the location of the natural resources on the Island.
- U Design a development plan and assess its impact on the Island's natural resources.
- U Determine if the development plan leaves enough natural resources for survival and enough protected undeveloped land.
- U Discuss environmental, social, and economic impact of different settlement patterns on the island.



Nat. Res.

Standards of Learning:

Science 4.5, 4.8; Math 4.22; Computer/Technology 5.4

Skills:

Comparing
Interpreting
Organizing Information
Inferring
Analyzing

Key Terms / Concepts:

Sustainability
Resource Depletion
Conservation

Supplies



You Will Need

- Wilwebe Island Packet
- Drawing materials
- Paper
- Scissors
- Tape

Background:

Using natural resources to meet human needs and wants impacts the environment. Every time these natural resources are used, there are social, ecological, and economic effects. In order to survive in an undeveloped area, humans must meet their basic needs of food, shelter, water and space. Many natural resources are limited, and it may not be possible for all needs to be met. Choices will be necessary. Settlement in undeveloped areas disrupts the habitat of the living things in that area and could decrease the food supply, interrupt migration patterns and routes, and pollute the water supply.

Settling the land in a sustainable way requires living in harmony with the soil, water, plants and animals, managing these natural resources wisely, and utilizing conservation techniques to meet present needs and future needs.

Getting Ready:

For each student group, make copies of Willwebe Island Packet (consisting of Willwebe Island map (NR 4), resource location and map symbols chart (NR 5), description of Willwebe Island (NR 6), shelters on Willwebe Island (NR 7, 7A) and resource use worksheet (NR 8).

Procedure:

Activity 1

1. Discuss the survival needs of settlers on an undeveloped island.
2. Have students make a list of what settlers should look for in a potential place of development.
3. Discuss how developers might design their settlement to have the least impact on the island's natural resources. Clustering shelters together, for example, reduces the amount of land used and minimizes the impact on the existing habitat. Ask students for other ways to lessen the impact on the island's habitats.

4. Pass out the map of Willwebe Island (NR 4). Using the resource location and map symbols chart (NR 5), have students identify the natural resources on the island and where they are located.

5. Have students write an advertisement to attract new settlers to the Willwebe Island Settlement. The ad should include promotional information about natural resources on the island.

Activity 2:

1. Pass out the description of Willwebe Island (NR 6) and shelter on Willwebe Island (NR 7, 7A), and the resource use worksheet (NR 8) pages.

2. Divide the students into four groups of settlers.

3. Encourage the settlement groups to develop the island in a way that is accommodating to future generations. This addresses the issues of resource depletion and conservation – for every action there are environmental, economic and social consequences. Shelter units should be placed in such a way that they do not deplete the food resources needed for survival. Tell students that in an effort to make a sustainable community, they will need to leave as much undisturbed area as possible.

4. Read the description of Willwebe Island and the conditions for survival (NR 6). Instruct students to trace and cut out any combination of shelter units to house the 25 settlers. The group must all agree on the types of houses and their placement.

5. Count the number of natural resource emohs covered by the shelters. Subtract this number from the first column on the resource use worksheet and enter into the second column. These numbers represent the remaining resources from which they will meet their food needs.

6. Allocate the natural resource emohs that will be used for food. This is the third column on the resource use worksheet. Calculate the fourth column by subtracting column three from column two.

7. Instruct students to follow the requirements to form preserves with the remaining resource emohs.

8. Have all groups present their development plans and assess which decisions seem most sustainable.

9. Discuss with students the consequences (positive and negative) of some of the decisions they made. For example, clustering shelters might have helped settlers develop a strong sense of community, while single dwellings give individuals more personal access to natural resources. How did the groups decide on which resources to use – were any resources valued more than others? You might find that often food resources were considered more important than grasslands. How many protected areas were the groups able to preserve? Were there economic consequences to any

of their decisions? If so, did they have a positive or negative effect on their community?

Enrichment:

1. Create a newsletter of the daily life in the settlement.
2. Write letters to relatives “left behind” about the new Willwebe sustainable community.
3. Have each student team build a clay relief map of the island, make paper dimensional models of the natural resources, and interlocking stick models of their shelters. Place the models where the students think they should be located. Have students design several development plans and assess the impact on the natural resources for each plan.
4. Using the Internet sites listed, have students study the information on Jamestown to learn about the daily lives of early settlers in Virginia. Identify what habitats already existed in the space that would become Jamestown. Make a list of natural resources available to the settlers (trees for building and firewood, animals and plants for food). Discuss any natural resources that were needed but not available to early settlers.

Assessment:

1. Examine student development plans and worksheets for use of such sustainable development ideas as cluster housing and protected areas. Use a rubric to grade the models.
2. Monitor the settlement groups and logs to evaluate individual student ability to contribute to group discussion and seek the ideas and opinions of others.
3. Evaluate the discussion to determine comprehension of the social, economical, and environmental consequences of their decisions.

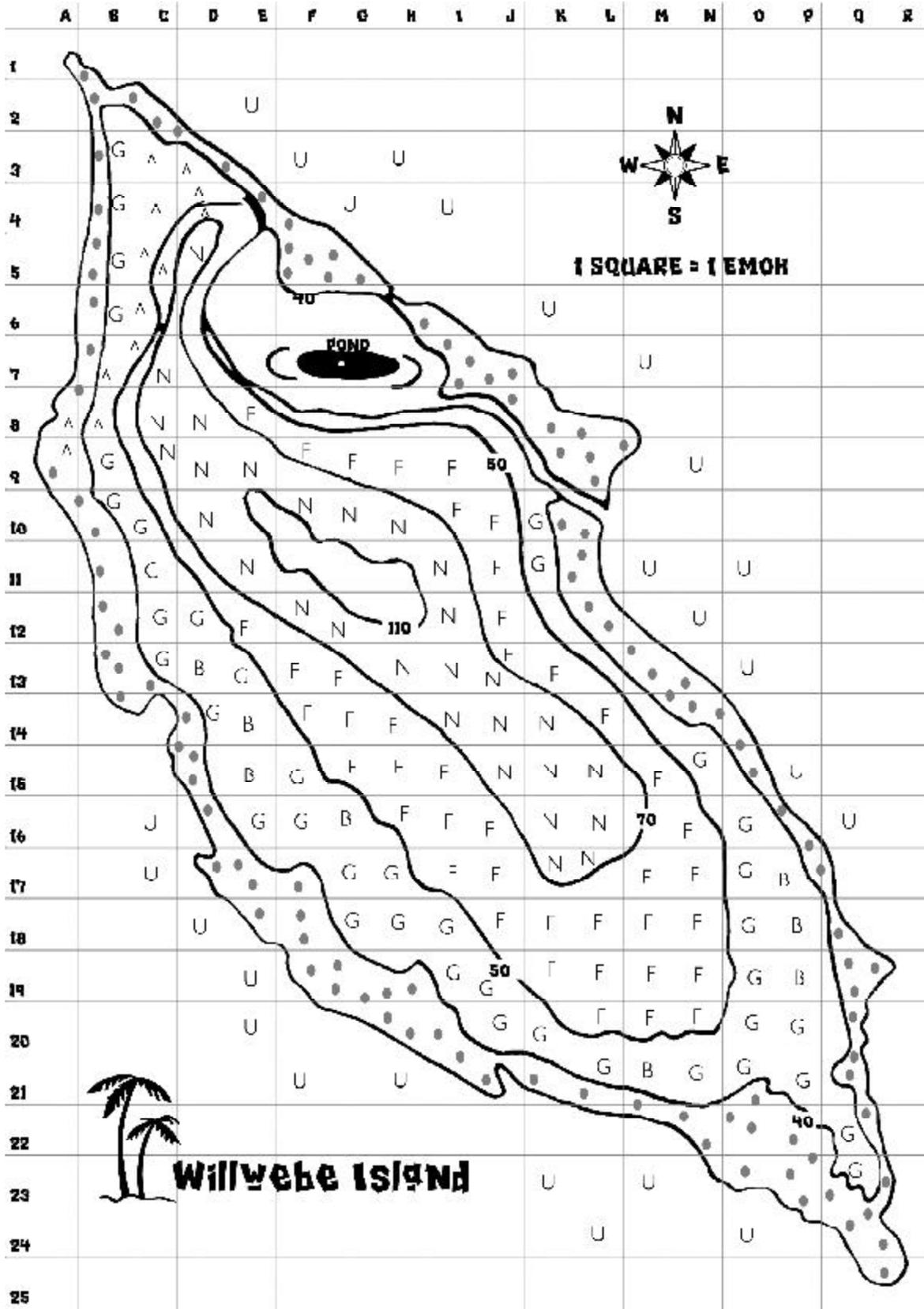
Resources:

Dabney, Virginia, *Virginia: The New Dominion* (Charlottesville: University Press of Virginia), 1992.

Gritzer, Charles F. *Exploring Our World, Past and Present*, (Lexington: DC Heath and Co.), 1991.

www.apva.org/jr.html - Jamestown Rediscovery Website sponsored by the Association for the Preservation of Virginia Antiquities'

www.iath.virginia.edu/vcdh/jamestown - Virtual Jamestown and Archives



NR 4

RESOURCE LOCATION AND MAP SYMBOLS CHART

- N Nut Trees grow on all land on the island at the altitudes from 70 feet up to 110 feet.
- F Fruit Trees grow on all the land on the island at the altitudes from 50 to 70 feet.
- B Berry Bushes grow only at 40-50 feet.
- G Grass grows at 40-50 feet in areas where there are no berry bushes.
- • • Sandy Soil is located in all land at 40 feet or lower.
- Freshwater Pond is located at the northeast part of the island and an altitude of 40 feet. It covers more than 9 emohs.
- Freshwater Stream flows from the southeast end of the pond to the cove. It flows southeasterly following the contours of the land from an altitude of 40 feet to the cove going through the coordinates of I-8, J-8, K-9, L-10.
- UU Salty Water surrounds the island.
- ^ ^ Rocky Cliffs are on the west portion of the island at coordinates B7-8, C3-7, D3-4.
- EMOH One unit of space (land or water)

WILLWEBE ISLAND

Willwebe Island is a very special, beautiful island with some unusual vegetation. It's size is about 187 emohs, and there are a variety of topographic conditions. The elevation rises sharply on the west portion of the island where there are steep, rocky cliffs. This area is unsuitable for homes. Water flows from the rocky cliffs to the east into a freshwater pond. The pond in the northeast part of the island covers about 8 emohs and is at an altitude of 40 to 50 feet. A stream flows southeast from the pond to the cove. The island is surrounded by salty water.

There are flat open areas on the east and south ends of the island. On the east end near the sheltered cove, the land is sandy and low enough to be flooded (lower than 40 feet) – this land is unsuitable for growing food or building homes. The land from 40 to 50 feet grows grass and bushes with delicious berries. There are no large trees at this altitude.

There is one level area on the top of the hill in the center of the island. It is high enough to provide protection from floods and is clear of any vegetation. At the higher altitudes on the sides of the hill grow wonderful, nutritious nut trees. Edible fruit trees also grow on the sides of the hill at the lower altitudes (50 – 70 feet).

There are 25 settlers that are going to settle the island. All have agreed to live in harmony with nature while meeting their basic survival needs without depleting the resources on the island. Each settler is to have shelter. Each settler has brought enough clothing for one year, enough food for one week, and all the tools necessary for building shelter and harvesting food.

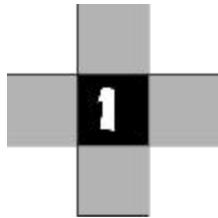
The settlers will need to make choices as to where to build their shelter and how to live in a way that attempts to leave enough resources for future generations to live on Willwebe Island. Future generations will have many of the same needs as these settlers do for food, water, shelter, and space. The nuts, fruits and berries on the island provide all of the food needs for the 25 settlers if they do not use them all to build and locate their shelters. **The goal of Willwebe Island is to have as many preserved areas as possible while still providing food and shelter for the 25 settlers.**

Settlers have many choices to make. First, they must decide what type of shelter to build. Secondly, they will need to decide where to locate the shelters. Any settlement will displace some natural resources, which the settlers will need for food. Natural resource decision-making considers the limits of the environment and its components. Responsible stewardship of the land and the natural resources requires wise choices.



SHELTERS ON WILLWEBE ISLAND

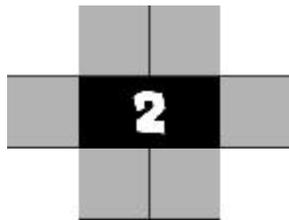
House Shapes and Emohs Used



SINGLE SETTLER HOUSE

Requires 1 complete emoh for the house and 4 emohs of land around the house.

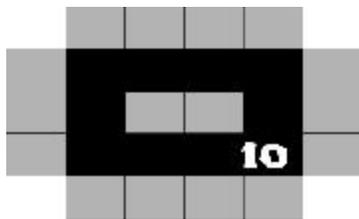
Total: 5 emohs.



TWO -SETTLER HOUSE

Requires 2 complete emohs for the house and 6 emohs of land around the cluster house.

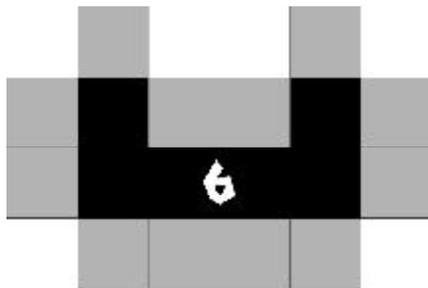
Total: 8 emohs.



THREE-SETTLER HOUSE

Requires 3 complete emohs for the house and 8 emohs of land around the cluster house.

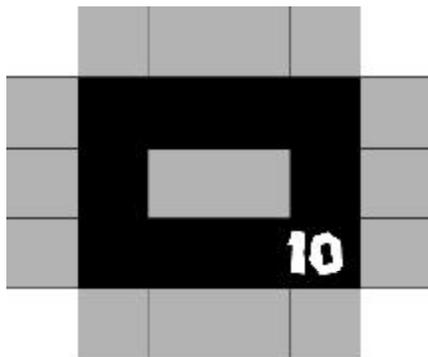
Total: 11 emohs.



SIX-SETTLER U-HOUSE

Requires 6 complete emohs for the cluster and 12 emohs of land around the cluster house.

Total: 18 emohs.



TEN-SETTLER BLOCK HOUSE

Requires 10 complete emohs for the cluster and 16 emohs of land around the cluster house.

Total: 26 emohs.

SHELTERS ON WILLWEBE ISLAND

Houses may be located anywhere on the island except on the sandy soil, the rocky cliffs, or in the pond and stream. The settlers should preserve the maximum amount of land and resources, in deciding the location of the houses. The houses may be arranged in clusters. Each shelter requires one or more **complete** emohs of suitable land. Additionally, each house needs space around it. The space around a house **can** be shared with another house as long as the houses do not touch one another. The area around a house **may** include the sandy soil, rocky cliffs, or pond and stream as long as the house is completely located on land suitable for building.

RESOURCE USE WORKSHEET

Preserved habitat areas are made up of 4 adjacent (touching) emohs that contain either a berry bush, nut or fruit tree, or grass. These areas can be **any** 4-emoh shape, as long as the corners touch - side by side, in a vertical or horizontal row, in a box shape, with corners meeting. Not all of the unused resources will form a preserve – preserves are **only** made when there are 4 emohs touching. **The goal is to have as many preserved areas as possible while still providing food and shelter for the 25 settlers.**

The best settlement plan will leave the maximum amount of resources and preserved areas. For the settlers to survive there must be 25 emohs of any combination of food and 10 emohs of grass.

Resources on Island	Resources available before settlement	Resources available after houses are built	Resources used to survive (at least 25 food and 10 grass)	Resources remaining
Berry Bushes (B)	8			
Fruit Trees (F)	43			
Nut Trees (N)	29			
Grass (G)	41			
TOTAL	121			

How many preserves were you able to make? _____

NOTES