Natural Resources for Grade 4 is a "hands-on" environmental activities unit designed for teachers to use with their students. Activities are chosen from natural resource programs such as Project Learning Tree, Project WILD, Aquatic Wild, and Project WET. The activities address natural resource themes and meet the Virginia Standards of Learning for Grade 4. The 30 lessons contained within cover a number of topics including weather, plant anatomy, life processes, plants and animal in an ecosystem, and Virginia's natural resources. The lessons are interdisciplinary in their approach, meeting objectives from science, mathematics, oral language, reading, literature, writing, and research skills. (DDR)
Connections: Weather, Systems & Resources

Unit

Grade 4

"Meeting the SOLS Using Natural Resources"
Inspired by a Course at VA Tech College of Forestry and Wildlife,
Summer 1996 (Kathy Sevebeck, Instructor)
Developed by Pat Cross and Catherine R. Ney
Christiansburg Elementary School
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Unit Description
Natural Resources is a “hands-on” environmental activities unit designed for teachers to use with their fourth-grade students. Activities were chosen from natural resource programs (Project Learning Tree, Project WILD, Aquatic Wild, and WET), UNITES program, and other sources for their ability to address natural resource themes, while meeting the Virginia Standards of Learning (SOL) for grade 4.

SOL
Science:
4.1 Plan and conduct investigations
4.2 Investigate & understand energy is needed to do work (machines)
4.4 Investigate & understand basic anatomy & life processes of plants
4.5 Study plant & animal ecosystems
4.6 Study weather condition & phenomena
4.8 Study Virginia natural resources

Math:
4.11 Estimate & measure weight/mass, and estimate conversion of ounces & grams
4.12 Estimate and measure length
4.13 Estimate and measure length using measuring devices
4.14 Use perimeter & find perimeter in standard & nonstandard units of measure
4.19 Collect, organize, and display data

English:
Oral Language
4.1 Use effective oral communication skills in a variety of settings
4.2 Make and listen to oral presentations and reports

Reading/Literature
4.4 Read fiction and nonfiction
4.5 Demonstrate comprehension of a variety of literary forms

Writing
4.6 Read a variety of poetry
4.7 Write effective narratives and explanations
4.8 Edit final copies of writings

Research
4.9 Use information resources to research a topic

RESOURCES

Teacher Sources:
Naturescope: Weather, National Wildlife Federation
National Wildlife Federation
1400 Sixteenth Street, N.W.
Washington, DC. 20036-2266

Aims Activities: Primarily Plants
Related Poetry:
The Random House Book of Poetry for Children, Jack Prelutsky
Animals, Animals Eric Carle

Student Sources:
Weather Words, Gail Gibbons
Storms, Seymour Simon
Cloudy with a Chance of Meatballs, Judi Barrett
What Causes It? A Beginning Book About Weather, Jane Moncure
I Can Be a Weather Forecaster, Claire Martin
The Cloud Book, Tomie de Paola
A Seed is a Promise, Claire Merrill
The Tiny Seed, Eric Carle
Trees, Jonathan Pine
Be a Friend to Trees, Patricia Lauber
Red Leaf, Yellow Leaf, Lois Ehlert
The View from the Oak, Herbert and Judith Kohl
Animal Fact: Animal Fable, Seymour Simon
The Frog Prince, Mark Teague
The Desert is Theirs, Byrd Baylor
Owl Moon, Jane Yolen
Owl at Home, Arnold Lobel
The Way Things Work, David Macauley
Mother Goose, Cyril Richard, Celeste Holm, and Boris Karloff
Where Do You Think You Are Going, Christopher Columbus? Jean Fritz
The First Dog, Jan Brett
Just a Dream, Chris Van Allsburg
Fish Calendar, Siegfried Schmitz
Heron Street, Ann Turner

Students read:
Owls in the Family, Farley Mowat (25 copies)
Where the River Begins, Thomas Locker (25 copies)
Paddle to the Sea, Holling Clancy Holling (25 copies)
A River Ran Wild, Lynne Cherry (25 copies)
The Aesop for Children, Milo Winter (25 copies)

List of Activities in the Unit:
“Thunderstorm” Project WET p. 196
“Stormy Weather” Project WILD p. 26
“Poetic Precipitation” Project WET p. 182
“Follow the Front” NatureScope: Wild About Weather p. 21
“Cloud Chart” NatureScope: Wild About Weather pp. 32, 33
“Seed Need” Project WILD p. 78
“Inside a Seed”, “Seed Grows”, “It’s in a Bag” Aims: Primarily Plants pp. 2-15
“Adopt a Tree” PLT p. 66
“Air Plants” PLT p. 85
“Bursting Buds” PLT p. 232
“Planet of Plenty” PLT p. 24
“Water Address” Project WET p. 122
“Can It Be Real” PLT p. 30
“Quick Frozen Critters” Project WILD p. 122
“Grasshopper Gravity” Project WILD p. 16
“Designing a Habitat” Project A/W p. 20
“Owl Pellets” Project WILD p. 144
“Deadly Links” Project WILD p. 270
“Humpty Dumpty” Project WET p. 316
“Energetic Water” Project WET p. 242
“Branching Out” Project WET p. 129
“Rainy Day Hike” Project WET p. 186
“Sum of the Parts” Project WET p. 267
“Who Lives Here” Project WILD p. 174
Lesson 1: Weather

"Thunderstorm" Project WET p. 196

Objective: Students will work cooperatively to mimic the sounds of a thunderstorm, become aware of the sounds of a thunderstorm, and monitor precipitation.

Materials: Tin can, ruler, pencil, portfolio, drawing paper

Procedures:
1. Simulate sounds of a thunderstorm
2. Read *Weather Words*, Gail Gibbons
3. Create sounds of a thunderstorm
4. Build a rain gauge (tin can, ruler)

Evaluation: Draw or write stories about thunderstorms, and measure and record precipitation using constructed rain gauges.

SOL

Science: 4.1 Plan and conduct investigations
4.6 Study weather condition & phenomena

Math: 4.11 Estimate and measure length

English: Reading/Literature
4.3 Read and learn the meaning of unfamiliar words
4.7 Write effective narratives and explanations
**Lesson 2: Weather**


**Objective:** Students will describe how the Earth, sun, water, and air affect weather and investigate the characteristics of a tall tale and myth.

**Materials:** copies of *American Tall Tales* and *NatureScope* p. 7, pencil, paper

**Procedures:**
1. Describe how the Earth, sun, water, and air affect weather
2. Read *American Tall Tales*, Mary Pope Osborne
   a. Read "Sall Ann Thunder Ann Whirlwind" p. 15
   b. Discuss the characteristics of a tall tale

**Evaluation:** Write a weather myth or tall tale after listening to several

**SOL**
- Science: 4.1 Plan and conduct investigations
  - 4.6 Study weather condition & phenomena
  - 4.7 Study relationship among Earth, moon & sun
- English: Reading/Literature
  - 4.5 Demonstrate comprehension of a variety of literary forms

**Lesson 3: Weather**

*Stormy Weather* Project WILD p. 26

**Objective:** Students will investigate and understand weather phenomena; and understand humans and wildlife share a common environment, and experience some of the same natural phenomena

**Materials:** Drawing paper

**Procedures:**
1. Read the poem "Rainstorms" and chant and clap to the rhythm of the poem
2. Share weather experiences
3. Read *Cloudy with a Chance of Meatballs*, Judi Barrett (fiction)
4. Read *Storms*, Seymour Simon (nonfiction)
5. Compare *Storms*, Seymour Simon (nonfiction) with *Cloudy with a Chance of Meatballs*, Judi Barrett (fiction)
   - Write your own version "Cloudy with a Chance of ________________"
6. Simulate a field trip
   a. Read aloud Project WILD p. 26, 27
   b. Discuss the concept that many animal (including people, pest, wildlife) share a common environment
   c. Describe the experience
   d. Draw mental pictures
   e. Pantomime animal actions during the story

**Evaluation:** Write a natural-phenomena story (drought, snowstorm, food, tornado, fire, earthquake) from either a child or wild animal’s point of view
Lesson 4: Weather
"Poetic Precipitation" Project WET p. 182
Objective: Students will investigate and understand characteristics of rain, recognize how rain clouds are formed, and recognize that thoughts and feelings are influenced by weather conditions.
Materials: journal, balloons (½ of class), garbage bags, samples of rain poems and songs
Procedures:
1. Explore characteristics of rain
Evaluation: Evaluate students abilities to accurate simulate rain clouds

Lesson 5: Weather Experiment
Objective: Students will investigate and understand how weather conditions occur.
Materials: Experimental Lab Sheet, yardstick, balloons, yardsticks, string, pin, books
Procedures:
1. Explore that air has weight and moves form an area or higher to lower pressure
2. Read What Causes It? A Beginning Book About Weather, Jane Moncure
3. Experiment # 1:
   a. Make a yardstick balance
   b. Why does the balance tip when one balloon is deflated? (deflated balloon weighs less than inflated one)
4. Experiment # 2:
   a. Fill balloons with air
   b. Release them outdoors
   c. Why did the balloons zip away? (air moves from an area of higher to lower pressure)
Evaluation: Assess student abilities recording results accurate on Experimental Lab sheets
Lesson 6: Weather
“Follow the Front” NatureScope: Wild About Weather p. 21
Objective: Students will explain what a front is and define the terms warm front and cold front.
Procedures:
1. Make a paper model of a warm front and a cold front
2. Read I Can Be a Weather Forecaster, Claire Martin
3. Explain what a front is (NatureScope: Wild About Weather p. 16, 17)
   b. Discuss how warm and cold fronts are formed
Evaluation: Check student records of what happens “front wise” each day (newspaper, Internet, and other media sources)

Lesson 7: Weather
“Cloud Chart” NatureScope: Wild About Weather (Insert between pp. 32 and 33)
Objective: Students will investigate and identify different types of clouds
Materials: Copy NatureScope: Wild About Weather (Insert between pp. 32 and 33), blue bulletin-board paper, pencils, crayons, markers, yardsticks
Procedures:
1. Read The Cloud Book, Tomie de Paola
   a. Observe clouds in the sky
   b. Write your observations
2. Design a cloud chart
   a. Discuss the characteristics of clouds (cumulus=puffy, bulgy clouds, stratus=low, gray clouds, cirrus=high wispy clouds)
   b. Use the insert (NatureScope: Wild About Weather between pp. 32 and 33) to build a cloud chart
3. Share cloud charts with the class
Evaluation: Assess accuracy of student cloud charts

SOL
Science: 4.1 Plan and conduct investigations
4.6 Study weather condition & phenomena
Math: 4.12 Estimate and measure length using actual measuring devices
English/Writing: 4.7 Write effective narratives and explanations
4.8 Edit final copies of writing
Lesson 8: Plant Anatomy & Life Processes

"Seed Need" Project WILD p. 78

Objective: Students will be able to explain how seeds are carried by animals, investigate and understand how through seed dispersal wildlife contribute to a healthy ecological system.

Materials: Fuzzy sock, tape, magnifying glasses, clear cups, graph paper, drawing paper

Procedures:
1. Explore how seeds are dispersed
2. Read A Seed is a Promise, Claire Merrill
3. Gather seeds by going outside and wearing old socks over shoes
   a. Carefully remove socks
   b. Examine the seeds with a hand lens
   c. Chart the seeds on graph paper
   d. Try growing the seeds in a cup
4. Draw pictures of seeds that are transported by animals and identify the part of the seed that makes this possible

Evaluation: Assess student abilities to explain in story form “How Seeds Scatter and Grow”

SOL

Science: 4.1 Plan and conduct investigations
        4.4 Investigate & understand basic anatomy & life processes of plants

English: Oral Language: 4.1 Contribute to group discussions
        Reading/Literature: 4.4 Read fiction and nonfiction
        Writing: 4.7 Write effective narratives and explanations

Lesson 9: Plant Anatomy & Life Processes

"Inside a Seed", "Seed Grows", "It’s in a Bag" Aims Activities: Primarily Plants pp. 2-15

Objective: Students will plant seeds and observe and understand how they grow and what they look like

Materials: Copy selected pages from Aims Activities: Primarily Plants pp. 2-15, bean seeds, plastic sandwich bags, portfolio

Procedures:
1. Observe the structures of a typical plant
2. Read The Tiny Seed, Eric Carle
3. Look inside a bean seed
4. Soak the bean seed overnight
5. Place it in a plastic bag and watch it grow
6. Record the growth of the bean seed on a graph
7. Write a story titled “The Bean Seed” and describe how it grew (root, stem, leaves, and flower)

**Evaluation:** Assess student stories on how well they explained germination

**SOL**

Science: 4.1 Plan and conduct investigations
   4.4 Investigate basic anatomy & life processes of plants
Math: 4.19 Collect, organize, and display data on graphs

English: Reading/Literature:
   4.4 Read fiction and nonfiction
   4.7 Write effective narratives and explanations

**Lesson 10:** Plant Anatomy & Life Processes

*“Adopt a Tree” PLT p. 66*

**Objective:** Students will investigate and describe through observation a chosen tree and organize information about it

**Materials:** Drawing paper, copy of PLT p. 68, centimeter tapes

**Procedures:**
1. Investigate the structure of a tree
2. Read *Trees,* Jonathan Pine
3. Choose a tree
4. Describe the tree using your senses
5. Work in pairs: measure its height, circumference, and crown
6. Create a picture of a flip-up tree

**Evaluation:** Assess student abilities by examining essays about the life of a tree from the tree’s perspective

**SOL**

Science: 4.1 Plan and conduct investigations
   4.4 Investigate basic anatomy & processes of plants
Math: 4.12 Estimate and measure length using actual measuring devices

English: Oral Language: 4.2 Make and listen to oral presentations and reports
   Writing: 4.7 Write effective narratives and explanations
   Research: 4.9 Use information resources to research a topic

**Lesson 11:** Plant Anatomy & Life Processes

*“Air Plants” PLT p. 85*

**Objective:** Students will demonstrate and describe the process of photosynthesis; and investigate and understand how humans depend on photosynthesis for survival.

**Materials:** Activity sheet *PLT* p. 87, large ball of string

1. Discuss how plants are different from people (make their own food=photosynthesis)
2. Read *Be a Friend to Trees*, Patricia Lauber

3. Perform experiment
   a. Give each child a 20-foot string (5 foot, each side) and make a square
   b. Arrange squares into a grid
   c. Share that plots in grid represent area needed by group for one day’s oxygen supply

**Evaluation:** Assess student completion of activity sheet (*PLT* p. 87) and oral presentation of information on sheet.

**SOL**

- **Science:** 4.1 Plan and conduct investigations
  - 4.4 Investigate basic anatomy & life processes of plants
- **Math:** 4.12 Estimate & measure length
- **English/Oral Language:** 4.1 Contribute to group discussions & support opinions
- **Reading/Literature:** 4.4 Read fiction and nonfiction

**Lesson 12: Plant Anatomy & Life Processes**

**“Bursting Buds” *PLT* p. 232**

**Objective:** Students will investigate and understand the purpose of a tree’s buds, and describe where leaves come from and how they form.

**Materials:** drawing paper, notebooks

**Procedures:**
1. Observe the size and structure of a plant as an adaptation to its habitat
2. Read *Red Leaf, Yellow Leaf*, Lois Ehlert
3. Observe a tree or shrub every few months throughout the year
   a. Ask students where will new leaves come from? (buds)
   b. Describe how leaves are formed
   c. Measure the growth of leaves

**Evaluation:** Record observations throughout the year, and write a description of how buds change into leaves

**SOL**

- **Science:** 4.1 Plan and conduct investigations
  - 4.4 Investigate basic anatomy & life processes of plants
- **Math:** 4.12 Estimate and measure length using measuring devices
- **English/Writing:** 4.7 Write effective narratives and explanations

**Lesson 13: Plants and Animals in an Ecosystem**

**“Planet of Plenty” *PLT* p. 24**

**Objective:** Students will investigate the diversity of life on Earth and understand its importance

**Materials:** Measuring tape, clipboard, pencils, writing paper, string, magnifiers, poster board

**Procedure:**
1. Explore an ecosystem made up of plants and animals
2. Read *The View from the Oak*, Herbert and Judith Kohl
3. Part A: “Mission to Planet Earth”
a. Pretend students are scientists from planet Devoid studying life on Earth
b. Plot, study, record, describe, and classify all life forms on Earth
c. Work in teams

4. Part B: “Diversity Data”
   a. Mark boundaries of observation area (20-foot square)
   b. Predict the types of life forms
   c. Examine and record data from their area

5. Part C: “Back on Devoid”
   a. Present findings from each team
   b. Take notes on other team findings
   c. Draw conclusions about the number and kind of plants and animals found

Evaluation:
1. Write a letter to a pen pal to another planet describing what you found on Earth
2. Assess data collection, clarity of presentations, and accuracy of conclusions

SOL

Science: 4.1 Plan and conduct investigations
         4.5 Study plant & animal ecosystems
Math: 4.12 Estimate and measure length

English: Oral Language: 4.1 Contribute to group discussions, and support opinions
         4.2 Make and listen to oral presentations
Reading/Literature: 4.4 Read fiction and nonfiction
Writing: 4.7 Write effective narratives and explanations

Lesson 14: Plants and Animals in an Ecosystem

“Water Address” Project WET p. 122

Objective: Students will recognize water-related adaptations of some plants and animals

Materials: Copy Water Address Cards Project WET p. 124-125, pencils, paper, world map, encyclopedia, 3”x 5” index cards

Procedure:
1. Identify plant and animal adaptations and their habitats by analyzing clues
2. Read The Desert is Theirs, Byrd Baylor
   a. List the plants and animals in this desert book
   b. Compare plant and animal adaptations in the desert to the Arctic, aquatic, temperate, or rain forest habitat
   c. Write about a different habitat titled “The ________ is Theirs”
3. Play riddle game “Water Address”
   a. Hand out a set of Water Address Cards to each group
   b. Pick one member of the group as a “reader”
   c. Assign points according to the number of clues read before the name of the organism and its water address is guessed (i.e., 1 clue= 4 points, 2 clues= 3 points, 3 clues=2 points, and all 4 clues=1 point)
   d. Continue the game until all the cards have been read

Evaluation:
1. Identify an organism and its environment based on a set of clues
2. Create and write clues for a different organism
3. Evaluate written descriptions of a different habitat

SOL

Science: 4.1 Plan and conduct investigations 
4.5 Study plant & animal ecosystems
Math: 4.19 Collect, organize, and display data
English: Oral Language: 4.1 Use effective oral communication skills
Reading/Literature: 4.4 Read fiction and nonfiction
4.5 Demonstrate comprehension of a variety of literary forms
Writing: 4.7 Write effective narratives and explanations
4.9 Use information resources to research a topic

Lesson 15: Plants and Animals in an Ecosystem
"Can It Be Real" PLT p. 30

Objective: Student will investigate unusual plants and animals and describe their adaptations to environments

Materials: Copy PLT pp. 33 & 34, pencils, research Internet, CD-ROMs, books for unusual plants and animals, poster board, markers

Procedures:
1. Investigate extraordinary plants and animals to gain insight into adaptations to ecosystems
2. Read The Frog Prince, Mark Teague
   a. Ask if the story could be real
   b. Write why you think the story is real (fact) or unreal (fiction).
3. Part A: “Stranger Than Fiction”
   a. Pass out copies of fictitious plants and animals PLT p. 33
   b. Choose whether the animal or plant is “real” or “fictitious” based on descriptions
   c. Identify all the plants and animals as “real”
4. Part B: “The Adaptables”
   a. Discover the unique adaptations (PLT p. 34 “Amazing Animals & Plants”)
   b. Create a poster describing their animal
   c. Present posters to the class

Evaluation: Assess presentations of posters for clarity of understanding the relationship between species adaptations and the environment

SOL

Science: 4.1 Plan and conduct investigations 
4.5 Study plant & animal ecosystems
Math: 4.19 Collect, organize, and display data
English: Oral Language: 4.1 Use effective communication skills
4.2 Make and listen to oral presentations and reports
Reading/Literature: 4.4 Read fiction and nonfiction
4.9 Use information resources to research a topic

Lesson 16: Plants and Animals in an Ecosystem
**Quick Frozen Critters** *Project WILD* p. 122

**Objective:** Students will investigate and understand the importance of adaptations in predator/prey relationships

**Materials:** food tokens (pennies), arm bands, 4-5 hula hoops, pencil, paper

**Procedures:**
1. Read *Animal Fact: Animal Fable*, Seymour Simon
2. Play a version of "freeze tag"
   a. Select students as either "predators" (one predator per four prey) or "prey"
   b. Identify one end of a playing field or gym the "food source" and the other end the "shelter"
   c. Place 4-5 hula hoops as additional shelter in the space between the ends
   d. Prey start rounds by moving from their "shelter" to the "food source" to collect one token (penny) each round
   e. Prey may "freeze" or find "shelter" to avoid being caught
   f. Predators must capture two prey by removing their arm bands

**Evaluation:** Discuss effective ways prey avoided capture and compare them to animals in the wild

**SOL**

Science: 4.1 Plan and conduct investigations
4.5 Study plant & animal ecosystems

English: Oral Language: 4.1 Use effective communication skills
4.4 Read fiction and nonfiction

**Lesson 17: Plants and Animals in an Ecosystem**

**"Grasshopper Gravity"** *Project WILD* p. 16

**Objective:** Students will observe live grasshoppers and investigate relationships between structure and function, recognize wildlife occurs in a variety of size and forms, and understand the responsibility and power of humans regarding animals

**Materials:** Copy "Grasshoppers" *Project WILD* p. 17, tennis-ball collection containers, magnifiers, pencil

**Procedures:**
1. Observe, handle and describe live grasshoppers or crickets
2. Read several of Aesop's fables, including "The Ass and the Grasshopper" *The Aesop for Children*, Milo Winter p. 56
   a. Discuss the lesson in the story, "The laws of nature are unchangeable"
   b. After reading several, write your own fable
3. In fall, collect one grasshopper for every two students
   a. Use tennis-ball containers
   b. Carefully observe the grasshoppers without harming them
   c. Answer the question sheet titled "Grasshoppers" *Project WILD* p. 17

**Evaluation:** Discuss how grasshoppers fit into the ecosystem (What do they eat? What eats them?)

**SOL**

Science: 4.5 Investigate & understand how plants & animals ecosystems interact
Lesson 18: Plants and Animals in an Ecosystem

“Designing a Habitat” Project A/W p. 20

Objective: Students will investigate and understand the components of a habitat that is suitable for the survival of most aquatic animals

Materials: 3x5 cards, modeling clay, 1"square graph paper, popsicle sticks, Easter grass, cotton balls

Procedures:
1. Design a habitat suitable for aquatic wildlife to survive in a zoo
2. Read Owls in the Family, Farley Mowat
   a. Design a habitat for the two owls
   b. Discuss the pros and cons of keeping wild animals in captivity
3. Procedure:
   a. Prepare animal cards
   b. Research (in teams of two to four) their animals using Internet (Check out TechnoZoo “http://www.bev.net/education/schools/ces/”, CD-ROMs, library books
   c. Design and build a model of a zoo exhibit on 1"square graph paper
   d. Summarize components of each habitat (food, water, shelter, and space)

Evaluation:
1. Assess the 3D model for accuracy
2. Test the components of a suitable habitat to insure that survival needs were met

SOL

Science: 4.1 Plan and conduct investigations
4.5 Study plant & animal ecosystems
Math: 4.12 Estimate and measure length
4.14 Use perimeter and find the perimeter in both standard and nonstandard units of measure
4.19 Collect, organize, and display data

English: Oral Language: 4.1 Use effective oral communication skills
4.2 Make and listen to oral presentations and reports

Reading/Literature: 4.4 Read fiction and nonfiction
Research: 4.9 Use information resources to research a topic

Lesson 19: Plants and Animals in an Ecosystem

“Owl Pellets” Project WILD p. 144

Objective: Students will be able to construct a food chain

Materials: Copy key, owl pellets, tweezers, tape, large pieces of tagboard, “A Home for Pearl” video

Procedures:
1. Examine owl pellets in order to construct a simple food chain
2. Read Owl Moon, Jane Yolen
a. Render the text by writing phrases from the book on the chalkboard
b. Write your own “Owl” story or poem
3. Purchase owl pellets from biological supply or wildlife refuge
4. Activity:
   a. Divide students into groups of two to four
   b. Separate the bones from the fur and feathers
   c. Examine, identify, and label the bone structures using a key
5. Draw a food chain that includes the owl (e.g., owl, field mouse, grasshopper, seeds, sun)
6. View “A Home for Pearl” (3-15 to 20 minute segments on wildlife)
Evaluation: Assess student food chains for accuracy
SOL
   Science: 4.1 Plan and conduct investigations
              4.5 Study plant & animal ecosystems
   English: Reading/Literature
              4.4 Read fiction and nonfiction
              4.6 Read a variety of poetry
   Writing: 4.7 Write effective narratives
   Research: 4.9 Use information resource to research a topic
Lesson 20: Plants and Animals in an Ecosystem
“Deadly Links” Project WILD p. 270
Objective: Students will understand how pesticides can enter and possibly harm food chains
Materials: Plastic grocery bags, colored arm bands (2 red, 6 green, 18 white)
Procedures:
1. Investigate ways pesticides enter a food web
2. Read the ridiculous stories of Owl at Home, Arnold Lobel
   -Write your own funny story about an owl
3. Substitute food chain for an owl, field mice, grasshopper and wheat seeds
4. Procedure:
   a. Divide students into three groups: 3X as many field mice as owls, and 3X as many grasshoppers as field mice (e.g., 26 students = 18 grasshoppers, 6 field mice, and 2 owls)
   b. Hand each grasshopper a plastic bag (stomach)
   c. Distribute multi-colored square pieces of paper over an open space (field, gym, or classroom)
   d. Take turns collecting food: First grasshoppers gather square pieces; then field mice gather grasshoppers (stomach bags); and finally owls collect bags (stomach bags) from the field mice
5. Examine the contents of the owls’ bags
   a. list contaminants (pesticides) in the food chain (i.e., multi-colored square pieces)
   b. Record the number of pesticides in the food chain
   c. Write how the pesticides got into the food chain using a cumulative tale such
as "This is the House That Jack Built" (e.g. This is the habitat where Owl lives; these are the field mice that Owl eats; these are the field mice who eat the grasshoppers who ate the grain that live in the habitat where Owl lives; this is Owl who eats the field mice who eat the grasshoppers who ate the polluted grain in the habitat where Owl used to live...)

Evaluation: Give three examples of ways in which pesticides could enter a food chain and discuss two possible consequences

SOL

Science: 4.1 Plan and conduct investigations
        4.5 Study plant & animal ecosystems

English: Reading/Literature
        4.4 Read fiction and nonfiction
        Writing: 4.7 Write effective narratives and explanations

Lesson 21: Plants and Animals in an Ecosystem

"Humpty Dumpty" Project WET p. 316

Objective: Students will investigate and understand the challenges of restoring an altered natural environment, and simulate a restoration process by putting an ecosystem back together again

Materials: Copy of the puzzle pattern Project WET p. 321, old magazines, glue, scissors, tagboard, objects with multiple parts

Procedures:
1. Read the Mother Goose, Cyril Richard, Celeste Holm, and Boris Karloff, nursery rhyme "Humpty Dumpty"
   - Discuss how Humpty Dumpty would look if he was put back together again
2. Make a nature scene puzzle
   a. Distribute copy of the puzzle pattern Project WET p. 321
   b. Glue the pattern onto tagboard and cut around the circle
   c. Cut out nature scenes from magazines and glue it to the other side of the tagboard
   d. Put the puzzles back together again
3. Disassemble and reassemble discarded items (spring-loaded pens, clock, radio, toy, fry pan)
4. Compare restoration in real-life to the puzzle and other items they reassembled

SOL

Science: 4.1 Plan and conduct investigations
        4.2 Investigate & understand energy is needed to do work (machines)
        4.5 Study plant & animal ecosystems

Math: 4.2 Solve problems involving pattern identification & completion of patterns

English: Oral Language: 4.1 Use effective oral communication skills
        Reading/Literature: 4.4 Read fiction and nonfiction

Lesson 22: Simple Machines

"Energetic Water" Project WET p. 242
Objective: Students will investigate and understand how water can be used to do work

Materials: Wood blocks, coarse sandpaper, glue, masking tape, paper cups, Styrofoam pieces, pipe cleaners, plastic spoons, plastic straws, scissors, corks, cardboard, string, tongue depressors

Procedures:
1. Design devices to make water do work
2. Explore the wheel and axle at work with The Way Things Work, David Macauley pp. 36, 37 (also CD-ROM)
3. Discuss how moving water changes from potential to kinetic energy to do work (e.g., grind grain, tell time, lift ships, operate cars, train, and ships)
4. Share “Water Through Time” time line Project WET p. 245
5. Build a machine that shows how the energy generated by water can do work:
   a. Give each team a “Student Invention Kit”
   b. Allow teams time to complete projects
   c. Demonstrate team solutions to the problem

Evaluation:
1. Write a description of how your machine works
2. Identify what energy form was used and what work was done
3. Assess models for design accuracy

SOL

Science: 4.1 Plan and conduct investigations
   4.2 Investigate & understand energy is needed to do work (machines)

English: Oral Language: 4.1 Use effective oral communication skills
   4.2 Make and listen to oral presentations

Reading/Literature: 4.4 Read fiction and nonfiction
   4.7 Write effective narratives

Lesson 23: Virginia’s Natural Resources

“Branching Out” Project WET p. 129

Objective: Students will construct a watershed model to investigate and understand how water flows in watershed and drainage patterns

Materials: Make a transparency of “Branching Patterns” Project WET p. 132, spray bottles, blue-colored water, drawing paper, pencil, blue pencils, tracing paper, maps of local rivers

Procedures:
1. Read Where the River Begins, Thomas Locker
   -Do the activity “Where the River Begins” UNITES V2 (4), p. 58
     a. Map the river in the story
     b. Map a local river (e.g., New River) from its source to its mouth
     c. After reading the story, use your senses to write about a trip along a river
2. Build a model of a watershed:
   a. Wrap rocks with white paper and lay them in an aluminum pan
   b. Sketch “high” and “low” spots
c. Spray blue-colored water over the model and note where it flows
d. Mark the actual branching patterns with blue pencil
e. Determine if smaller watersheds overflow into larger ones (Is there one place or more than one place water collects?)

3. Compare drawings with pictures in Where the River Begins

**Evaluation:**
1. Compare drainage pattern of watersheds to other branching networks
2. Write a story or draw a map of drainage patterns in your watershed

**SOL**
- Science: 4.1 Plan and conduct investigations
- 4.8 Study Virginia natural resources
- Math: 4.19 Collect, organize, and display data

**Lesson 24: Virginia’s Natural Resources**

**“Rainy Day Hike” Project WET p. 186**

**Objective:** Students will investigate and understand the concepts of watersheds, and identify how water flows over the school grounds

**Materials:** Maps of local community, showing streams, lakes, and topography, drawing paper, copy the Legend Project WET p. 190 (2 sets), rain gear, clip boards with paper, plastic wrap, pencils

**Procedures:**
1. Introduce students to the concept of watersheds by collecting data about water flowing over the school grounds
2. Read Paddle to the Sea, Holling Clancy Holling
   - Do activity “Paddle to the Sea” UNITES V2 (4), p. 47
     a. Keep a diary of Paddle’s trip to the sea
     b. Diagram the tributaries (river branches) Paddle took on his way to the sea
3. Part I:
   a. Create a map of the school grounds (divide the grounds into sections and assign groups to map each area)
   b. Predict where water flows onto the school grounds
4. Part II:
   a. Tour the school grounds on a rainy day
   b. Compare predictions with actual flow of water on the school grounds
5. Extension: Measure the slope gradient
6. Have Paddle boat races down the slopes

**Evaluation:**
1. List ways the school grounds positively affect water passing through the watershed
2. Locate sources of point and non-point source pollution on the school grounds

**SOL**
- Science: 4.1 Plan and conduct investigations
- 4.8 Study Virginia natural resources
Lesson 25: Virginia's Natural Resources

“Sum of the Parts” Project WET p. 267

Objective: Students will recognize everyone is responsible for a river’s water quality.

Materials: White bulletin-board paper, drawing pencils or markers, pencil, scissors

Procedures:

1. Read A River Ran Wild, Lynne Cherry
   - Do the activity “A River Ran Wild” UNITES V2 (5), p. 123
     a. Represent “polluter” or “filterers”
     b. Write captions explaining the degradation and restoration of the river on a timeline

2. Activity:
   a. Pass out “pieces” (use Project WET p. 267 to label) of property along a stream
   b. Draw how you would use your property, if given a million dollars
   c. Put the puzzle “pieces” together to form a stream

Evaluation:

1. Assess student abilities to transfer this process to a lake system
2. Once puzzle pieces are put together, discuss individual contributions to total water quality
3. Write a paragraph identifying what students can do to protect water quality

SOL

Science: 4.1 Plan and conduct investigations
       4.8 Study Virginia natural resources
Math: 4.1 Identify, orally and in writing, place value of digits
English: Oral Language: 4.1 Use effective oral communication skills
          Reading/Literature: 4.4 Read fiction and nonfiction
Writing: Write effective narrative and explanations

Lesson 26: Virginia's Natural Resources

“Who Lives Here” Project WILD p. 174

Objective: Students will identify some native and non-native animal inhabitants of Virginia.

Materials: Research materials (CD-ROM, Internet, library books), writing materials, pencils

Procedures:

1. Read Where Do You Think You Are Going, Christopher Columbus, Jean Fritz
   a. Discuss how Columbus and his crew were not alone on the voyages
   b. Columbus, other explorers, and settlers introduced many non-native inhabitants to the New World (grasses and wild flowers, horses, cows, pigs)
2. Guess whether animals are native or non-native
   a. Some introduced species (clover, dandelion, brown trout, rainbow trout, pheasant, carp, starlings, wild boars, nutria, killer bees, gypsy moths, Norway rat, English sparrow, Hungarian partridge,)
   b. Some native species (wood rat, bald eagle, bluebird, coyote, bear, white-tailed deer, cotton-tailed rabbit, field mice, raccoon, possum)
3. Research one of Virginia’s inhabitants
   Evaluation: Assess student abilities to name five species that are native to Virginia and five species that are non-native
   SOL
   Science: 4.1 Plan and conduct investigations
   4.8 Study Virginia natural resources
   English: Oral Language: 4.1 Use effective oral communication skills
   Reading/Literature: 4.4 Read fiction and nonfiction
   Research: 4.9 Use information resources to research a topic
   Lesson 27: Virginia’s Natural Resources
   “Animal Charades” Project WILD p. 4
   Objective: Students will be able to distinguish between domesticated and non-domesticated animals
   Materials: Writing paper, container, pencils
   Procedures:
   1. Read The First Dog, Jan Brett
      a. Examine how humans domesticated (tamed) the dog
      b. Compare domesticated with wild animals
   2. Play “Animal Charades”
      a. Write name, animal’s name, and whether domesticated or wild on a slip of paper
      b. Draw a name from a container
      c. Portray and guess the animal
   SOL
   Science: 4.1 Plan and conduct investigations
   4.8 Study Virginia natural resources
   English: Oral Language: 4.1 Use effective oral communication skills
   Reading/Literature: 4.4 Read fiction and nonfiction
   Lesson 28: Virginia’s Natural Resources
   “Dragonfly Pond” Project Aquatic WILD p. 154
   Objective: Students will investigate and understand human impact on our natural resources
   Materials: Copies of cut-out sheets Project Aquatic WILD p. 158,159, scissors, masking tape, glue, poster board
   Procedures:
   1. Read Just a Dream, Chris Van Allsburg
      a. Discuss how humans have altered the environment in Walter’s dream
      b. Write about how you would like to see the environment in the future.
2. Activity:
   a. Distribute copies of cut-out sheets *Project Aquatic WILD* p. 158,159
   b. Divide the class into teams of four students
   c. Have each team represent an interest group (i.e., residents, farmers, business, gas station owners, parks department personnel, highway department personnel, bleach factory)
   d. Use cut outs to make a community around Dragonfly Pond
   e. Find the perimeter of Dragonfly Pond in metric and other standard units of length

3. Share team communities
4. Consider the consequences of human actions

**Evaluation:** Name three things that people can do to reduce or prevent damage to wetlands

**SOL**

Science: 4.1 Plan and conduct investigations
        4.8 Study Virginia natural resources

Math: 4.14 Identify and describe situations representing the use of perimeter and use measuring devices to find the perimeter

English: Oral Language: 4.1 Use effective oral communication skills

Reading/Literature: 4.4 Read fiction and nonfiction

Writing: 4.7 Write effective narratives and explanations

**Lesson 29: Virginia’s Natural Resources**

“Fishy Who’s Who” *Project Aquatic WILD* p.86

**Objective:** Students will investigate and identify the major species of fish that live in Virginia

**Materials:** Paper, information sources (Internet, telephone, library, family members), pencils

**Procedures:**
1. Read *Fish Calendar*, Siegfried Schmitz
2. Activity:
   a. Make a list of fish that live in the state
   b. Identify the major aquatic habitats on a state map.
   c. Divide the class into research team

   1. Find sources of information (e.g., Department of Game and Inland Fisheries)
   2. Use sources to develop biographies of fishes that include fish’s name, where it live, its habits, and interesting fish facts
   3. Sketch fish
   4. Share information

**Evaluation:** Assess the clarity and accuracy of reports presented by research teams

**SOL**

Science: 4.1 Plan and conduct investigations
        4.8 Study Virginia natural resources
Lesson 30: Virginia's Natural Resources

"Environmental Exchange Box" Project WET p.61

Objective: Students will increase their understanding of Virginia’s natural resources

Materials: Books about state’s natural history, markers, crayons, photos, and other art supplies

Procedures:
1. Read Heron Street, Ann Turner
   a. Discuss how Virginia has changed since the settlement of Jamestown in 1607
   b. Make a time line mural of Virginia’s environment since 1607
2. Find another group (class) to exchange information
   a. Brainstorm items to include in the box
   b. Collect items
3. Examine contents of other’s box
4. Based off information in the box, write stories about adventures in other lands

Evaluation: Assess stories about adventures in other lands on how well students incorporate information in the box into their stories

SOL

Science: 4.1 Plan and conduct investigations
        4.8 Study Virginia natural resource

English: Oral Language: 4.1 Use effective oral communication skills

Reading/Literature: 4.4 Read fiction and nonfiction

Writing: 4.7 Write effective narratives and explanations
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