
So – What’s Happening Here, On this Old Christmas Tree Farm?

þby

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Overview: An overgrown Christmas tree farm next to the school is undergoing change. Some of the trees are dying while others appear sickly. Students gather and organize data in an attempt to solve this ecological “mystery.” **(This format could be used to solve any “local” ecological mystery.)**

Curriculum Connection: Students have or are concurrently studying biomes and ecosystems in science. In addition, they have participated in a literature circle based on Jean Craighead George’s ecological mysteries. An annotated bibliography and lesson plan are available for the literature circle.

Teaching Level: 5 - 6

Time Frame: One to two weeks depending upon schedule. Easy to modify.

Connection to National Geography Standards:

The World in Spatial Terms

- How to use maps, and other geographic representations, tools and technologies to acquire, process and report information from a spatial perspective

Environment and Society

- How human actions modify the physical environment

Connection to Oregon State Standards:

Geography

- Examine and prepare maps, charts and other visual representations to locate places and interpret geographic information
- Describe ways people have adapted to and been influenced by their physical environment
- Distinguish essential and incidental information clarifying an issue

Science

- Identify interactions among the parts of a system
- Organize evidence of change over time
- Use basic science skills to observe, measure, predict...

Materials List:

- Thermometer, soil & air
- Sling psychrometer
- Cloud chart
- Beaufort Scale
- compass
- rain gauge
- 50’ measuring tape
- Field journal data sheet

- Quinlan, Susan E. (1995). The Case of the Mummified Pigs and Other Mysteries in Nature. Pennsylvania: Boyds Mills Press. ISBN: 1-878093-82-7.

Inquiry Question: What ecosystem components and human interactions are coming together on our schoolyard to create the sickly and dying forest?

Objectives:

- Students will use field skills to gather and organize data to assess changes happening in the former Christmas tree farm.
- Students will identify human actions which may have precipitated this mystery.

Background:

This practical, field-oriented lesson assesses whether students can transfer critical thinking and literature in the science content area readings into solving a similar ecological crisis in their own ecosystem. In this case, a school yard has an overgrown Christmas tree farm and a student-created pond undergoing change. Students gather data including mapping the site to solve the “mystery.”

Introduction:

1. Remind student of previous studies in science and social studies regarding biomes and ecosystems.
2. Make reference to the literature circle of Jean C. George’s books
3. Review knowledge using a ***K-H-W-L*** chart. (attached.)

Procedures:

1. Read an ecological mystery from Susan Quinlan’s book, The Case of the Mummified Pigs and Other Mysteries in Nature.
2. Inform students that they will be conducting a field study and make observations like Spinner and Alligator in The Case of the Missing Cutthroats in order to solve the mystery of the Christmas tree farm and disappearing pond. The outcome of the study will be an understanding of why change occurs and suggestions about what we can do.
3. Students look at the site with teacher to familiarize themselves with it. No notes.
4. In classroom, brainstorm – what did you observe, what are your questions, what should our field data sheet look like, what do we need to do first. Information is recorded on flip chart paper and left displayed.
5. Form teams to tackle each category decided upon. Make sure there is planning time to meet objectives
6. Meet and review progress. Solve problems. Once students have agreed on a field form, prepare and copy for students. Contact people needed to help or to interview. Arrange for classroom visit or telephone interview.
7. Make several field visits with objectives such as map the site, identify trees, shrubs, flowers, animals present. Set up long-term data-gathering sites and flag. Start collecting and recording data.
8. Make 10 to 12 visits and record.
9. Start data analysis.
10. Prepare visual data displays by teams and write speeches. Answer the inquiry question.
11. Present findings to several groups such as another class, school board, parents or at a Family Geography Night.

Extensions & Modifications:

- Deal with an issue found in the newspaper
- Complete the literature circle unit using Jean C. George’s ecological mysteries
- Conduct the “*Can Do*” lesson from Project Wild
- Complete the lessons in the “*Patterns of Change*” storyline in Project Learning Tree

Assessment:

1. Use a simple criteria guide for the visual displays (sample attached).
2. Use the State of Oregon scoring guide to score the verbal presentation.
3. Geography:
 - Notes assessed for completeness
 - Student self-reflection & learning’s
 - Students teach basic field study skills at a Family Geography night
 - Present to a field geography class from WOU or OSU or TC’s in area for feedback

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Name(s): _____

Date: _____

Solving An Ecological Mystery

What I **Know**

How I Know It

What I **Want** to Know

What I’ve **Learned**

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Name: _____
Ecological Mystery Visual Checklist
Date: _____

**Checklist for Visual Display
Ecological Mystery**

_____ 1. **LEGIBILITY**

.
5 4 3 2 1 NA
.
5 4 3 2 1 NA
.
2 1 NA
.
6 5 4 3 2 1 NA
.
5 4 3 2 1 NA
.
room 6 5 4 3 2 1 NA
.
readable to the audience
.
5 4 3 2 1 NA
.
6 5 4 3 2 1 NA

_____ 2. **ART**

.
5 4 3 2 1 NA
.
2 1 NA

used pen or marker as appropriate 6
erased all guiding pencil marks 6
letters are all the same size 6 5 4 3
used upper case & lower case letters
posters & displays can be read at 4' 6
overheads can be read in the back of the
papers & computer presentations
6 5 4 3 2 1 NA
if handwritten, in ink and legible 6
if computer, font is 12 point or more
sized so that it can be easily seen 6
appropriate for the subject 6 5 4 3

6 5 4 3 2 1 NA

2 1 NA

3. GENERAL APPEARANCE

5 4 3 2 1 NA

5 4 3 2 1 NA

wise crumpled

NA

5 4 3 2 1 NA

TOTAL POINTS EARNED:
ADDITIONAL COMMENTS:

color is used, or if appropriate pen/ink

pencil guidelines erased 6 5 4 3

No erasure holes or leftover crumbs 6

Name is on paper as instructed 6

Product is not crumbled, torn or other-
6 5 4 3 2 1 NA

Pride in work shows 6 5 4 3 2 1

Appropriate display medium chosen 6

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Field Data Sheet — Ecological Mystery

Day:	Date:	Time Out:	Time In:
Soil Temp:	Soil pH:	Air Temp:	RH:
Wind Speed:	Wind Direction:		
Precipitation:	Amount:	Type:	pH:
Sunrise:	Sunset:	Moonrise:	Moonset:

General Weather Observations including cloud types:

Particulate Strips (amounts and types of particulate on strip. Enclose strip in Ziploc bag, date and label bag, attach to field notes)

Map the site or specific features:

Four horizontal lines for mapping the site or specific features.

- (1984). **One day in the alpine tundra**. New York: HarperTrophy. 44 pp.
- (1986). **One day in the prairie**. New York: HarperTrophy. 50 pp.
- (1990). **One day in the tropical rain forest**. New York: HarperTrophy. 66 pp.
- (1995). **One day in the woods**. New York: HarperTrophy. 52 pp.

These are excellent supplemental books for learning about the biomes or ecosystems named in the individual titles. The tropical rain forest, prairie and woods are explored in some manner by a child who has a scientific mind (at least it seems so). The stories of the desert and alpine tundra are told by an animal who lives in the environment. Understanding the environment is the theme of these books. The story is not about the human in the story.

Each book is indexed by subject and contains a bibliography of additional resources on the subject. I like the books because they are short and at a reading level lower than most 5th grade science books. The books are so crammed full of information about the ecosystem though, that note taking is a must while reading. The reading level is easier than George's ecological mysteries, but the facts come fast and furious. Keeping notes of some sort are absolutely essential if you expect students to do anything other than read.

Subject Matter: Ecosystems in Science & Geography, Art, Reading in the content area, writing

Grade Level: 4 - 6

Geography Standards:

- à **2:** How to use mental maps to organize information about people, places and environments in a spatial context
- à **5:** That people create regions to interpret Earth's complexity
- à **8:** The characteristics and spatial distribution of ecosystems on Earth's surface
- à **15:** How physical systems affect human systems
- à **18:** How to apply geography to interpret the present and plan for the future

Use in Class:

- à Supplement science text with detail
- à Basis for further research about an ecosystem
- à Read for facts
- à Use to fill in details for ecosystem murals
- à Model for writing a book about ecosystem you live in
- à Reading in the content area

George, Jean Craighead. (1971). **Who really killed cock robin? an ecological mystery**. New York: HarperTrophy. 160 pp.

"Who Really Killed Cock Robin?" is the first of Craighead's ecological mysteries. Tony Isidoro, an eighth grader is a bird lover. He keeps detailed ecological notes about his town of Saddleboro for his older brother Izzy. Izzy, a graduate student, had been drafted into the Army before he could finish his thesis on the robins of Saddleboro. "*When Cock Robin was found on his back with his feet in the air, at seven minutes past six A.M. on the 24th of May,*" the entire town wanted to know what happened.

Tony is joined in his research by Mary Alice Lamberty, the daughter of the wealthiest man in town, and the owner of a textile plant, which had just been fined for polluting the river. Following a trail of clues and deciding on how they are related to each other, Tony uses careful fieldwork, excellent notes, field observations and help from the local college to bring understanding to the entire town. Among the clues are that the town park is overrun with ants, there are no frogs singing in parts of the river that contains a dangerous amount of an unknown chemical, and the town dump is emitting strange fumes.

This book does an excellent job of introducing students to PCB's and pesticide/insecticide pollution. Rachel Carson's Silent Spring and handbooks from the 1970's encouraging students to get involved in environmental conversation would be excellent additions for any study using this novel. National Geography Standard #17 might also come into play if the teacher uses an ecological mystery from the local area.

Subject Matter: Ecosystems in Science & Geography, Art, Literature & Reading, Research, Writing, Math

Grade Level: 5 - 6

Geography Standards:

- à 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
- à 2: How to use mental maps to organize information about people, places and environments in a spatial context
- à 8: The characteristics and spatial distribution of ecosystems on Earth's surface
- à 14: How human actions modify the physical environment
- à 17: How to apply geography to interpret the past
- à 18: How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample
- à Literature circle (lesson plan available)
- à Novel reading
- à Reading books by the same author
- à Pleasure reading
- à Use as a model to teach field observation

George, Jean Craighead. (1975). The case of the missing cutthroats: an eco mystery. New York: HarperTrophy. 145 pp.

“A skinny girl in mountain boots and bulky clothes stood on the bank of the river....Suddenly the fishing rod bowed like a question mark and the girl braced as the fish took her bait. The stones of the gravel bar rolled under her feet, and she was pulled ankle deep into the icy Snake River.” Meet

Spinner Shafter, 13, a city mouse and a ballet dancer from New York City, as she and her cousin Alligator Shafter undertake a backpacking trip in the wilds of the Gros Ventre to unravel the mystery of the cutthroat.

Spinner, vacationing with her dad, in Jackson Hole, Wyoming, catches a “monster” cutthroat in a creek that hasn’t had cutthroat trout in it in seven years. Her cousin, Alligator, wants to find out where the trout have gone. Using scientific observations, recording those observations and wondering aloud as they backpack, Spinner and “Al” put together the pieces of the puzzle. Along the way, Spinner meets a grizzly bear face-to-face, as well as bighorn sheep, ouzel and a myriad of aquatic insects. With “Al” as a guide, Spinner also meets herself in the journey and together they unravel the mystery and cement a long-lasting cousin friendship.

This book was first published in 1975 as Hook A Fish, Catch A Mountain. Since the book was published, cutthroat trout have returned to the upper Snake River drainage. That is why I added National Geography Standard 17 – it is possible to go back through Wyoming State Fish & Game records and follow the changes made to bring back the trout. This is a higher level project.

Subject Matter: Biomes & Ecosystems in Science & Geography, Art, Literature & Reading, Research, Writing, Math

Grade Level: 5 - 6

Geography Standards:

- à 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
- à 2: How to use mental maps to organize information about people, places and environments in a spatial context
- à 8: The characteristics and spatial distribution of ecosystems on Earth’s surface
- à 14: How human actions modify the physical environment
- à 17: How to apply geography to interpret the past
- à 18: How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample
- à Literature circle (lesson plan available)
- à Novel reading
- à Reading books by the same author
- à Pleasure reading
- à Use as model to teach field observation

George, Jean Craighead. (1983). **The talking earth**. New York: HarperTrophy. 151 pp.

Although not written as an ecological mystery, The Talking Earth follows in Craighead’s style of

combining ecosystem and animal knowledge into the story. Without the knowledge, the story does not make much sense.

Billie Wind is a 13-year-old Seminole girl. The story starts with Billie Wind facing the medicine man at the Council House. Her sister, Mary Wind, told the tribal elders that Billie did not believe in the legends of the tribe. Until Billie went to school at the Kennedy Space Center where her father works, she was Indian. But since then, her sister feels that Billie is too practical – a white man’s trait which is not honored. So Billie is sent, with blessings and in an ancient dugout canoe into the Everglades to spend two nights and three days.

An ecological event, an Everglades fire, prevents Billie from returning within the allotted time. The book is about Billie’s adventures and the understandings she comes to as she walks the line between her Seminole world and the “White Man’s” world. Historic culture reminders play an important part of this story.

The setting is the Florida Everglades and presents a different viewpoint than The Missing ‘Gator of Gumbo Limbo even though both are in the same setting and time period. I would also supplement this book with the 1992 issue of *National Geographic* that compares native American cultures in 1492, the year Columbus discovers Hispaniola.

Subject Matter: Biomes & Ecosystems in Science & Geography, Literature & Reading, Research, Writing, Seminole Indian culture

Grade Level: 5 - 8

Geography Standards:

- à **2**: How to use mental maps to organize information about people, places and environments in a spatial context
- à **6**: How culture and experience influence people’s perceptions of places and regions
- à **7**: The physical processes that shape the patterns of Earth’s surface
- à **14**: How human actions modify the physical environment
- à **18**: How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample
- à Literature circle (lesson plan available)
- à Novel reading
- à Reading books by the same author
- à Pleasure reading
- à Use as model to teach field observation
- à Supplemental reading on NA Indian cultures

George, Jean Craighead. (1992). The missing ‘gator of gumbo limbo: an ecological mystery. New York: HarperTrophy. 148 pp.

Liza K and her mom live in a swamp remnant of the Everglades, within a stone's throw of a golf course and condominiums. The divorce and her mom's decision to go back to school to get a better job to support them, left them living in a yellow tent in Gumbo Limbo. They live there along with other colorful "woods people" and the natural inhabitants including Dajun, a giant alligator.

Life changes for Gumbo Limbo and its inhabitants when Travis comes to hunt Dajun. Not only do Liza K and James James search for the missing Dajun, they have to avoid Travis, and find out what is happening to Gumbo Limbo; what ecological misfortune has caused Dajun to disappear and therefore, other changes to occur. Liza finds that what she is learning at school is helpful and that James James and Priscilla, other woods people, have talents and skills necessary for survival, not only of themselves but for the habitat.

Not only does this book make the web of life clear, but we read about homeless people who can and do make a difference for the environment.

Subject Matter: Biomes & Ecosystems in Science & Geography, Art, Literature & Reading, Geography Regions, Writing

Grade Level: 5 - 6

Geography Standards:

- à **1:** How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
- à **2:** How to use mental maps to organize information about people, places and environments in a spatial context
- à **8:** The characteristics and spatial distribution of ecosystems on
- à **14:** How human actions modify the physical environment
- à **18:** How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample
- à Literature circle (lesson plan available)
- à Novel reading
- à Reading several books by the same author
- à Pleasure reading
- à Use as model to teach field observation

George, Jean Craighead. (1993). **The firebug connection: an ecological mystery**. New York: HarperTrophy Books. 148 pp.

Maggi Mercer, a girl of 12, moves with her parents to the north woods of Maine for the summer. For as long as she can remember, she has spent the summer at the Biological Research Station. Her parents are professors at the University of Maine in Orono. Her father, a botanist, works with endan-

gered plants while her mother, Evelyn, is a dendrologist studying soils and the trees they nourish. Every summer Maggie has been the only child here. This summer, Mitch, a 10-year-old rascal whose father is the head of the university's forestry department is coming to visit.

In 11 chapters, Maggi and Mitch observe many natural and some seemingly not-so-natural phenomena take place. The firebugs that Capek, the entomologist, brings to Maggi seem not able to grow up. The bats in her bedroom, the field wasp and a spider are all recipients of Mitch and Maggie's field observations and experiments. Meanwhile, Andy and Grace help Maggie come to an understanding of the raven and Andy is helpful in unraveling the "firebug mystery".

The description of the woodlands biome as it appears in Maine, including an incredible animal and plant list, not to mention great vocabulary list, and a plot-driven story make this a good book for literature circles or for a teacher to read aloud.

Subject Matter: Biomes & Ecosystems in Science & Geography, Art, Literature & Reading, Geography Regions, Writing

Grade Level: 5 - 6

Geography Standards:

- à **1:** How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
- à **2:** How to use mental maps to organize information about people, places and environments in a spatial context
- à **8:** The characteristics and spatial distribution of ecosystems on
- à **14:** How human actions modify the physical environment
- à **18:** How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample
- à Literature circle (lesson plan available)
- à Novel reading
- à Reading several books by the same author
- à Pleasure reading
- à Use as model to teach field observation

George, Jean Craighead. (1995). **There's an owl in the shower**. New York: HarperCollins/Trumpet Club. 134 pp.

Borden Watson is angry - and he knows what to do. On his bike, he rides into a forest of northern California, chambers a shell in his rifle and waits! Waits for the owl to stick its head above its nest! "My father is the best cutter from here north through Canada and Alaska," – but the government seems to love owls more than people, he thought.

And so begins There's an Owl in the Shower, an entertaining and ecologically informative book by

Jean C. George. This time, she brings her unique writing style to the spotted owl issue of the Pacific Coast and easily tells the story of an orphaned spotted owl and the logging dependent family who have come upon economic hard times. The lives of the family and owl become intertwined thanks to Borden and his older sister Sally.

This is a good story about a family with members who have different values about how to use the environment. In the end, though, they find more in common than first appears.

In my “used-to-be” logging town, I would read this aloud and make sure the science part was being taught in science. I would then follow-up with another “environmental crisis” situation so that my students could discern that, regardless of the issue, there are certain facts that can always be deduced.

Subject Matter: Biomes & Ecosystems in Science & Geography, Literature & Reading, Research, Writing, Temperate Rain Forests

Grade Level: 5 - 8

Geography Standards:

- à **2:** How to use mental maps to organize information about people, places and environments in a spatial context
- à **6:** How culture and experience influence people’s perceptions of places and regions
- à **8:** The characteristics and spatial distribution of ecosystems on Earth’s surface
- à **14:** How human actions modify the physical environment
- à **18:** How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and have students keep journal on the book, writing responses for reading work sample)
- à Novel reading
- à Reading books by the same author
- à Pleasure reading
- à Use as model to teach field observation

Quinlan, Susan E. (1995). **The case of the mummified pigs and other mysteries in nature.** Pennsylvania: Boyds Mills Press. 128 pp.

What do the movie “Apollo 13” and Susan Quinlan’s ecological mystery book have in common? — How the scientific method of problem solving, careful observation and a mindset to solve puzzles or in current educational jargon – “think critically” come together. In this case, it is an understanding of the *land organism*, a concept Aldo Leopold wrote about in the 1950’s, that makes these mysteries solvable.

Ever since the scene in Apollo 13 where scientists work feverishly to create a square filter for a round CO₂ scrubber (or is it the other way around), I have thought about how to bring to my 5th grade classroom a level of reality that incorporates curiosity, critical thinking, cooperative, teamwork, record keeping, perseverance and authentic alternative assessment.

Each of the 14 chapters is a separate mystery with mind-tickling titles like “the Puzzle in the Post-card Scene” and “The Case of the Restored Forest.” Each mystery is well illustrated and with some assistance, the mysteries are readable for 5th grade. Older readers will have no problem and these could be read aloud to younger students. Teams of ecologists whose knowledge and understanding of nature have allowed them to fit part of the puzzle together to find the answer have investigated each mystery. The steps of the scientific method of problem solving are shown clearly, as are transitions among steps. If you want your class to follow a mystery, a bibliography of further reading for each mystery is included. As you read through the chapters, it becomes obvious to readers that there is rarely only **one** reason for something happening

Subject Matter: Biomes & Ecosystems in Science & Geography, Research, Writing

Grade Level: 5 - 8

Geography Standards:

- à **2:** How to use mental maps to organize information about people, places and environments in a spatial context
- à **6:** How culture and experience influence people’s perceptions of places and regions
- à **8:** The characteristics and spatial distribution of ecosystems on Earth’s surface
- à **14:** How human actions modify the physical environment
- à **18:** How to apply geography to interpret the present and plan for the future

Use in Class:

- à Read aloud and students keep journal writing responses for reading work sample
- à Introduction or authentic assessment to literature circle of George ecological mysteries
- à Use as model to teach field observation