



# ***Killing Killer Rain: Acid Rain and Environmental Health***

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for

**My Environment, My Health, My Choices**

An environmental health curriculum development project

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## ***KILLING KILLER RAIN***

### **PROJECT OVERVIEW/SETTING:**

#### **Acid Rain and Environmental Health: Why Study Acid Rain?**

I teach the history and current events of Canada and Latin America to seventh grade students at a private school. To participate in the *My Environment, My Health, My Choices* curriculum development project, I needed a topic related to at least one of these regions. From a history perspective, acid rain interested me because it has impacted the last 25 years of Canadian history, it affects both Canada and the United States (with each country causing problems for the other), and it is a vital issue to both New York State and its provincial neighbor, Ontario, Canada. Acid rain is also a current topic; in the last few years, New York and other states have taken legal and diplomatic steps to address the issue

This social studies unit was designed as one part of an interdisciplinary problem-based environmental health unit for middle school students. But, if teacher expectations for student performance are raised, the unit could easily be used for high school students. I have used the entire unit in my social studies class. Because of the unit's interdisciplinary approach, portions of this unit could be completed in science and English classes. For example, the oral reports and letter writing could be done during English classes. Research on acid rain, perhaps with supplementary laboratory activities, could be done in science classes.

This unit explores a complex, current topic that shows the international, "borderless" nature of certain environmental health issues. It is particularly suited to a social studies curriculum involving the study of Canada and the United States. In addition to the basic science knowledge required to understand acid rain, this unit also requires students to explore human health and environmental justice issues, and to use geography, research, writing, and public speaking skills. As an interdisciplinary unit, it also incorporates English language and science standards.

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## INTRODUCTION:

This 11-day unit uses integrated/interdisciplinary problem-based learning to focus on acid rain: its sources, environmental effects, health effects, economic impact, political impact, and potential solutions in the United States and Canada. The introductory problem, "Killing Killer Rain," asks students to research specific questions about acid rain in order to make recommendations to government officials about the future of coal-burning power plants, a major source of the acid rain. Questions raised are:

- Why do we have acid rain?
- Who is affected by acid rain?
- How dangerous is acid rain to our health?
- Are Americans and Canadians willing to make energy consumption sacrifices in order to tackle the acid rain problem?

Students are challenged to define the problem, to work in teams to research questions related to the problem, and to present their reports and recommendations to the class. For this unit, the class is divided into six research groups, each with students of mixed ability. Each group researches and reports on acid rain from a different perspective. Each group is assigned one of these six areas:

1. Sources, Geography and Geology
2. Potential Solutions
3. Environmental Impact
4. Economics
5. Politics
6. Human Health

Within each group, individual students do research on specific questions and then report their analysis of the research to others in their group. The group then uses this information to make recommendations for problem solutions and presents a report on their recommendations to the class.



## **GOALS & OBJECTIVES:**

### **The goals and objectives of this curriculum are:**

- To raise awareness among students about an environmental health issue that affects their lives
- To introduce students to a real world problem whose solution requires knowledge of geography, history, politics, sociology and economics.
- To engage students in active learning and problem solving through a problem-based learning scenario.
- To aid students in their search for information using both print and electronic sources, help students analyze information for authenticity and relevancy, and provide models for proper documentation of sources.
- To teach students how information can be used to help solve a problem.
- To encourage collaborative learning, interpersonal communication, and organizational skills through group work
- To encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches.
- To promote writing and public speaking skills through class presentations on group findings and recommendations.



## **UNIT OVERVIEW:**

### **Day One: Introduction to Environmental Health**

Students discuss the definition of environmental health in small groups. They brainstorm a list of things they could do to improve the environment and reduce environmental health risks.

- Teacher Information
- Handout #1 - Canada Map Assignment
- Answer Key to Canada Map Assignment

### **Day Two: Canadian Geography**

Using a cooperative classroom activity and a homework assignment, students establish their current level of knowledge of Canadian geography and gather new information. A classroom game is used to enhance knowledge.

- Teacher Information
- Handout #2 - Canada Geo Game
- Answer Key to Canada Geo Game

### **Day Three: Exploring the Problem as a Class**

The class reads and discusses the *Killing Killer Rain* scenario.

- Teacher Information
- Handout #3 - Killing Killer Rain

### **Day Four: Exploring the Problem in Small Groups**

Students are divided into six groups of three to four students to brainstorm questions about acid rain and environmental health. They also take a Canada Map Quiz.

- Teacher Information
- Handout #4 - Canada Map Quiz
- Answer Key for Canada Map Quiz
- Handout #5 - Killer Rain Assignment

### **Days Five, Six and Seven: Researching Solutions to the problem**

Students explore the question: *How would students advise US and Canadian officials about future energy policy regarding acid rain?* Groups are assigned a topic with related questions. They develop a research plan. They work in groups to conduct Internet and library research, or organize the results of their research, and to develop group reports.

- Teacher Information
- Handout #6 - Killer Rain Group Questions
- Handout #7 - Sources of Information about Acid Rain
- Handout #8 - Citation Formats



### **Days Eight, Nine and Ten: Presenting research**

Groups present their findings and recommendations to the class. After group reports are presented, discuss what students have learned and how students can make a difference. Students are then asked to write a draft letter stating their opinion regarding whether new coal-burning power plants should be built and whether anti-pollution requirements for older power plants should be reduced.

- Teacher Information
- Handout #9 - Killer Rain Summary Report Assessment
- Handout #10a or #10b - Write a Letter!

### **Day Eleven: Write a Letter**

Teacher returns the draft letters to students for peer review and revision. Students then write final letter and mail it to public officials.

- Handout #11 - Write a Letter Grading Rubric

### **UNIT ASSESSMENT:**

Students are graded for this unit based primarily upon the individually written summary reports contributed to their groups, the group presentations, the letters written to a public official, and participation in class discussions and group work.

- The Killer Rain Summary Report counts for 50% of the unit grade. It is scored out of 100 points as per the rubric provided.
- The Canada Map Quiz counts for 20% percent of the unit grade (84 points total).
- Homework counts for 15% of the unit grade. There are two formal homework assignments worth a total of 134 points.
  - The *Homework Canada Map* is worth 84 points
  - The *Write a Letter* homework assignment is worth 30 points. A rubric is provided for the. Write a Letter” homework assignment.
- Participation counts for 15% of the unit grade. Students are given 5 points for each day they contribute to group or class discussions.

### **TEACHER REFLECTION:**

By teaching this Environmental Health unit, I achieved my primary goals. My students gained



an understanding of the international nature of some environmental issues through their study of acid rain, they realized the complexity of the issue from the economic, health, and political perspectives, they noted the different ways Canada and the U.S. approached the same issues, they sharpened their research and public speaking skills, they reinforced their U.S.-Canada geographical knowledge, and, perhaps most importantly, they came to understand the importance of discussing and taking action on public issues. In fact, as an added bonus, the class received a congratulation letter from The Adirondack Council in the spring term for their participation in the process that led to a significant U.S. EPA ruling that should result in major cuts to emissions that cause acid rain.

The *Killing Killer Rain* scenario engaged my students primarily because most of them had their own stories from the Blackout of 2003 to share. The geography component establishes, early on in the unit, the shared boundaries and natural features of Canada and the U.S..

I was pleased with the level of sophistication many of the students reached in their understanding of the issues on all sides of the acid rain debate. Some of the reports were quite comprehensive. Moreover, many of the students used the information they had discovered quite well (and passionately) in their letters to public officials regarding energy and environmental policies currently being debated. Many also heard back from the public officials they wrote, including President Bush, Senator Charles Schumer, and Representative Louise Slaughter.

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## NEW YORK STATE EDUCATION STANDARDS

The *Killing Killer Rain* unit correlates with the following New York State education standards:

### English Language Arts:

Students will listen, speak, read, and write for information and understanding. As listeners and readers, students will collect data, facts, and ideas; discover relationships, concepts, and generalizations; and use knowledge generated from oral, written, and electronically produced texts. As speakers and writers, they will use oral and written language that follows the accepted conventions of the English language to acquire, interpret, apply, and transmit information.

Students will listen, speak, read, and write for critical analysis and evaluation. As listeners and readers, students will analyze experiences, ideas, information, and issues presented by others using a variety of established criteria. As speakers and writers, they will use oral and written language that follows the accepted conventions of the English language to present, from a variety of perspectives, their opinions and judgments on experiences, ideas, information and issues.

### Social Studies:

#### Standard 2: Information Systems

Students will access, generate, process, and transfer information using appropriate technologies.

#### Standard 3: Geography

Students will use a variety of intellectual skills to demonstrate their understanding of the geography of the interdependent world in which we live - local, national, global- including the distribution of people, places, and environments over the Earth's surface.

#### Standard 4: Economics

Students will use a variety of intellectual skills to demonstrate their understanding of how the United States and other societies develop economic systems and associated institutions to allocate scarce resources, how major decision-making units function in the U.S. and other national economies, and how an economy solves the scarcity problem through market and nonmarket mechanisms.

#### Standard 5: Civics, Citizenship, and Government

Students will use a variety of intellectual skills to demonstrate their understanding of the necessity of establishing governments; the governmental system of the U.S. and other nations; the U.S. Constitution; the basic civic values of American constitutional



democracy; and the roles, rights, and responsibilities of citizenship, including avenues of participation.

## **Mathematics, Science and Technology:**

### Standard 4

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

#### Intermediate Level:

- Performance Indicator 7.1 Describe how living things, including humans, depend upon the living and nonliving environment for their survival.
- Performance Indicator 7.2 Describe the effects of environmental changes on humans and other populations.

#### Commencement Level:

- Performance Indicator 7.1 Describe the range of interrelationships of humans with the living and nonliving environment.
- Performance Indicator 7.2 Explain the impact of technological development and growth in the human population on the living and nonliving environment.
- Performance Indicator 7.3 Explain how individual choices and societal actions can contribute to improving the environment.



## **Day One: An Introduction to Environmental Health**

**Description:** This class session is intended to generate student interest and excitement in the Killing Killer Rain environmental health unit as a unique learning experience.

**Objective:** Students will demonstrate comprehension and evaluation skills by defining the term “environmental health” and reflecting upon its relationship and importance to our lives.

**Time allotted:** One class period.

### **Materials:**

- Large sheets of paper (one per group)
- Tape, if paper is not self-adhesive
- Markers (one per group)
- List of students assigned to each of the six groups
- Blackboard, white board, or paper on wall for brainstorming
- One *Homework Canada Map* (Handout #1) per student

### **Activities:**

1. Model how to develop a working definition with the whole class by working through an example. A possible word to use for this exercise is “home economics.” After writing the term on the board, ask students to define “home” first, and write suggestions on the board. Do the same for the term “economics.” Ask students to suggest a definition for the entire term based upon their definitions of each word.
2. Group students into six teams of students (3-6 per team depending on class size). Provide each group with a large piece of paper, a marker, and a place in the room to work. Direct each group to take 10 minutes to compose its own working definition of “environmental health.”
3. Call the whole class back to order. Ask for a volunteer from each group to share its definition of “environmental health”, and write the definitions on the board. Work with the class again to craft a single working definition of the term “environmental health.”
4. As a whole group, take another 10 minutes to brainstorm a list detailing things that students think might impact our environmental health. Compile the list on the board.
5. Using the new list on the board, groups should work together to make alterations or additions to their original, working definitions of “environmental health”. Discussion can run until the completion of the allotted time.

**Homework for next class:** Hand out copies of Handout #1 *Homework Canada Map* to each student. Explain that their homework will be to fill in an extensive map of Canada.



Students may use any resources they can find, including textbooks, atlases, wall maps, encyclopedias, and the Internet. The information from this assignment will be used for a game on Day Two.



## **Day Two: Canada off the Top of Your Head - Geography of Canada Game**

**Description:** This lesson establishes the geography of Canada as it relates to the United States. It is optional if your students already comprehend geographical relationships between Canada and the United States. Using a simple cooperative classroom activity and their homework assignment, students discover their current levels of knowledge about the geography of Canada and gather new information.

**Objectives:** Students will use identification and research skills in a collaborative activity to help them learn anew or reinforce their knowledge of Canada's geography and introduce geographical terms they will need to understand and discuss Canada and the Canada-U.S. acid rain issue.

**Time allotted:** One and a half 45-minute sessions or a total of about 60 minutes.

### **Materials:**

- Wall map of Canada with masking or medical tape covering names of provinces, territories and their capitals, U.S. states bordering Canada, and major Canadian water bodies
- Five copies of *Canada Geo Game* (Handout #2), a fill-in-map of Canada showing the boundaries and locations of provinces, territories, capitals, U.S. states bordering Canada, and major Canadian water bodies
- One answer key to *Canada Geo Game* (for teacher)
- Access to wall maps of North America, atlases, encyclopedias, and the Internet
- One answer key to *Homework Canada Map* (for teacher)
- One red pen for each student
- Board and chalk or markers
- Prizes (for example, a "homework pass" or candy)

### **Activities**

1. Explain to students that you will not be collecting their homework until later in the period. Ask them to keep their homework sheets out of sight until then.
2. Divide students into mixed groups and allow them to choose their own group names and secretaries. On the board, make a column for each group.
3. Hand out one copy of *Canada Geo Game* to each group.
4. Allow student groups 10 minutes to fill in the blanks on their maps with the names of as many provinces, their capitals, bordering U.S. states, and water bodies as the group can generate *without* looking at their homework or any outside resources, including books, wall maps, the Internet, etc. Group secretaries write in the answers.



5. Call the class to order, allowing students to stay in their groups. Instruct the group secretaries to grade their groups' fill-in maps "on their honor." Using your *Canada Geo Game* answer key and a wall map of Canada with tape over the labels, ask students to help identify each province, territory, and their capitals, U.S. states bordering Canada, and important bodies of water in or bordering Canada. After a place is identified correctly, pull the tape off that label and ask the secretaries whether their groups identified that place correctly. For each place identified correctly, the group gets 5 points. Keeping a running tally of points, continue until all provinces, territories and their capitals, U.S. bordering states, and important water bodies have been identified. The secretaries should write in answers that their groups did not get. Provide answers for those places no groups identify.
6. Members of the group with the most points receive a prize (homework pass, candy).
7. Explain to students that the United States and Canada share the longest unprotected border in the world. We also share elements of a common history and culture, as well as climate, natural resources, physical geography, and environmental problems. Inform students that our environmental health unit will deal with one of these common issues.
8. Ask students to take out their *Homework Canada Map* answer sheets, and make sure each student has a red pen. Have students mark their homework sheets as you read the answers. Collect the marked homework sheets. Homework counts for 15% of the students' grade for this unit. For each correct answer on this homework exercise, students receive one Homework Point. The maximum points possible for this exercise: 84.

**Homework:** Study for *Canada Map Quiz* to be given on Day Four.



## **Day Three: Killing the Killer Rain Scenario**

**Description:** Students are introduced to the acid rain problem using a problem-based learning scenario *Killing Killer Rain*. This scenario is a fictional account of a 7<sup>th</sup> grade teacher who listens to the stories her students tell about what happened to them during the “Great Power Blackout” during the summer of 2003. Class discussion raises many questions about power generation in Canada and the United States. Students read the scenario, discuss the scenario, and work in groups to generate specific questions about acid rain.

**Objectives:** To engage students in active learning and problem solving through a problem based learning scenario.

**Time allotted:** One 45-minute session

### **Materials:**

- One copy of Handout #3 *Killing Killer Rain* for each student
- Board and chalk or markers

### **Activities:**

1. Briefly review what students learned in the first lesson establishing the geography of Canada. Remind them that Canada and the United States share a 5,525 mile border extending from the Atlantic Ocean to the Pacific Ocean. Ask students what major physical features are shared by the United States and Canada, and list them on the board. Responses might include the Great Lakes, the Rocky and Appalachian Mountains, the Great Plains, the Atlantic and Pacific oceans, and many rivers.
2. Divide the class into six mixed ability groups, each with three or four students. Ask each group to generate on a sheet of scrap paper a list of problems the United States and Canada might share as a result of their common border and physical features. Responses might include terrorism, pollution, immigration, water access, mineral access, and endangered species. List these on the board.
3. Distribute the *Killing the Killer Rain* scenario (Handout #3). Inform students that this scenario is based on a real situation. Explain that the situation is one that many of them experienced themselves. Ask students if they remember their own experiences during the power outage that struck the Northeast U.S. in August, 2003.
4. Have students read the scenario aloud in class, each student reading one paragraph. This problem-based learning scenario is entitled *Killing Killer Rain*. It is a fictional account of a 7<sup>th</sup> grade teacher who listens to the stories her students tell about what happened to them during the “Great Power Blackout” during the summer of 2003. The class’s discussion of this scenario should raise many questions about power



generation in the U.S. and Canada, its effects on the two countries' environments and economies, and how the media has handled such issues.

5. Explain that acid rain, the focus of this unit, is an issue that affects both the U.S. and Canada.
6. Ask students what they know about acid rain already. Write their ideas on the board.
7. Ask students why acid rain would be a particular problem between the United States and Canada. Remind students that in social studies they will be looking at how acid rain affects the economies, the politics, the environment, and people's health in Canada and the United States.
8. Make sure all students understand the terms and concepts involved in the reading. Ask students to:
  - a. Define such terms and phrases as "electric grid" and "lawsuit."
  - b. Explain the relationship between the "Great Power Blackout" during the summer of 2003 and "dead lakes", such as those found in the Adirondack Mountains area of New York State.
  - c. Share how they have seen or experienced the effects of acid rain.
9. Conduct a class discussion to establish some basic issues and questions raised by this scenario, and write the ideas on the board. The list might include:
  - a. How important is electricity to us, and what are we as a society willing to "pay" for it?
  - b. Is it fair for people in one part of the country or world to create pollution that hurts another part of the country or world, even if a lot of people benefit from what is being produced?
  - c. Does acid rain harm the health of people?
  - d. How do we know who or what to believe when we read about issues like this?
  - e. What is being done to solve the problems associated with acid rain?

**Homework:** Study for *Canada Map Quiz* (scheduled for next class period)



## Day Four: The Situation and the Task

**Description:** Students are presented with a situation and task that will direct their research on acid rain. They brainstorm a list of questions that will help them make informed recommendations about whether new coal-burning power plants should be built and whether anti-pollution laws should be relaxed for older power plants.

**Objectives:** Students will demonstrate their understanding of Canadian geography through a quiz. Students will brainstorm questions about the scenario, the situation, and the task.

### **Materials:**

- One answer key *Canada Map Quiz* (for teacher)
- One copy of Handout # 4 *Canada Map Quiz* for each student.
- One copy of Handout # 5 *Killer Rain Assignment* for each student

### **Activities**

1. Students take a 10-15 minute *Canada Map Quiz* (Handout #4) testing their knowledge of Canada's geography. Collect quiz. The quiz is out of 33 points, and students receive a percentage grade. Quizzes are 20% of the unit grade.
2. Hand out one copy of Handout #5 *Killer Rain Assignment* to each student. Have one student read out loud "The Situation" and another read out loud "Your Task" at the bottom of the handout.
3. Remind students that they will be working in groups and tell them that they will be given 5 points toward their daily participation grade for each day they contribute to their group or class discussions. The participation grade is 15% of the unit grade. Monitor each group's progress.
4. Ask each of the small groups to use a marker and their large pads of paper to generate a list of questions, required information, and experts who might help the class handle the task they have been presented. Prompt the groups by asking what information they need to know about coal-burning power plants and acid rain in order to make their recommendation to the government. Encourage them to address the questions: *Who? What? When? Where? How? and Why?* The groups should be given about 10 minutes to complete this exercise. **Notes to Teacher:** This works best if each group identifies one member to take notes and write down the questions. Inform students that they may choose a single spokesperson for their groups, or they may divide the report among group members.
5. Give groups 5 minutes to plan how they will present their questions.
6. Have each group tape or post its large paper on the board and present its ideas. As



they work, record their questions on another part of the board—these should be classified under the appropriate headings:

- a. Sources, Geography and Geology
  - b. Potential Solutions
  - c. Environmental Impact
  - d. Economics
  - e. Politics
  - f. Health
7. Once all of the groups have presented, discuss the most popular questions. Be sure to probe why particular questions are important.

**Homework:** Students are to use the Internet or magazines and newspapers at home or in the library to search for a recent news article dealing with acid rain. They will write a one- to two-paragraph summary of the article to hand in. “Recent” could be anything from the last two calendar years. The summary should include the publication name, the title of the article, the date, and the author. An attached copy of the article is useful, but not required. *A copy of the article is not a substitute for the one paragraph summary.* This homework activity is worth 30 homework points for this unit.



## **Day Five: Identify the Problem and Begin Research**

**Description:** Students organize their groups to begin researching both the questions that they generated in the previous class and the questions on their *Killer Rain Group Questions* sheets. They are provided with a list of suggested sources and information on the citation formats that they should use for their research.

**Objectives:** Raise students' awareness about environmental health issues that affect their lives. Encourage and sharpen basic research skills such as locating sources, taking notes, and citing sources. Help students analyze information for authenticity and relevancy. Develop skills for collaborative learning, interpersonal communication, and organization through group work. Teach students how information can be used to solve a problem. Encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches.

### **Materials:**

- One copy of Handout #6 *Killer Rain Group Questions* for each student
- One copy of Handout #7 *Sources of Information about Acid Rain* for each student
- One copy of Handout #8 *Citation Formats* for each student
- At least 10 note cards for each student (or have students bring these to class)
- Access to computer room with printer (and paper) and to the library

### **Activities:**

1. Students break into their groups. Remind students that their ultimate task is to advise U.S. and Canadian officials about whether to build new coal-burning power plants and whether to ease anti-pollution requirements for older plants.
2. Direct students to look at the third paragraph on the *Killer Rain Assignment* sheet (Handout #5) and follow along as you read the instructions. Read the rest of the assignment sheet to students and answer student questions about the assignment.
3. **Note to Teacher:** Be particularly clear about three matters:
  - Students in each group are responsible for dividing responsibilities within the group. That is, each student within the group should tackle specific questions on the group's list. However, group members are free to share sources of information with other members in order to help the whole group.
  - Each student must hand in a 1-2 page typewritten summary (report) addressing the questions he or she answered for the group. Although students would be wise to use these reports to help them prepare for their oral presentations, they should not read directly from their written reports.
  - Note cards are required to record information; students must document their



sources. (See Handout #5 for proper citation formats.)

4. Hand each student a copy of Handout # 6 *Group Questions*, Handout #7 *Sources of Information about Acid Rain*, and Handout #8 *Citations Formats*.
5. Tell students that they will have the remainder of Day Five class time and the next two class periods to work individually and with their groups to research their topic. They should use the questions generated in the previous class and the questions on the *Group Questions* sheets to organize their research.
6. Students should use Internet sources in the computer lab and print sources in the library. Be available to assist students in their searches for information and the writing of their summaries. Be certain to check that students are preparing note cards using the required citation formats.

**Homework:** Continue researching and writing note cards with citations.



## **Day Six: Continue Research**

### **Activities:**

1. Students work individually and in small groups to research the answers to their assigned questions.
2. Encourage groups to meet at least once to share the results of their research and identify needs for further research.
3. Be available to assist students in their searches for information and the writing of their summaries. Be certain to check that students are preparing note cards using the required citation formats.

**Homework:** Continue researching, writing note cards, and preparing to report the results of their research.



## **Day Seven: Continue Research and Organize to Prepare for Group Oral Reports**

### **Activities:**

1. During the first half of class, students work individually and in small groups to finish researching the answers to their assigned questions.
2. Encourage groups to meet at least once to share the results of their research and identify needs for further research.
3. Be available to assist students in their searches for information and the writing of their summaries. Be certain to check that students are preparing note cards using the required citation formats.
4. During the last half of class, students work in small groups to prepare for the group report that they will give on Day 8.

**Homework:** Continue researching and preparing for *Killer Rain* reports.



## **Days Eight, Nine and Ten (depending on class size): Group Reports**

**Description:** Groups present the results of their research and their recommendations to their classmates.

**Objectives:** Raise students' awareness about environmental health issues that affect their lives. Encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches. Encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches. Promote public speaking skills through class presentations on group findings and recommendations.

### **Materials:**

- Chalk, blackboard for students to use during their presentations.
- One copy of Handout #9 *Killer Rain Summary Report Assessment* for each student
- One copy of Handout #10a or #10b *Write a Letter!* for each student

### **Activities:**

1. Give all groups an additional 10 minutes to organize their information in preparation for their reports to the class. Remind them that their presentation should include: their findings about acid rain and their recommendation for whether the U.S. or Canada should build new coal-burning power plants and/or ease anti-pollution requirements for older plants.
2. Give each group 10 minutes to present its findings about acid rain and its sources to the class. Each group should also recommend whether the U.S. or Canada should build new coal-burning power plants and whether to ease anti-pollution requirements for older plants. Depending on the size of the class, the presentations should take 2-3 class periods.
3. At the end of each presentation, collect individual student summaries, citations, and note cards.

**Note to teacher:** Use the Handout #9 *Killer Rain Summary Report Assessment* to score each student's individual report as they present, and then use the same sheet to grade the written part of the project. It is strongly recommended that you complete the grade sheets for each student as soon as possible, preferably the day of a student's presentation. This will enhance your ability to remember and respond to each student's presentation; it will also make your grading management task far easier later.

4. After all groups have presented their reports, discuss the class's efforts and what it discovered about acid rain and its sources. Prompt students with questions such as:



- a. What was the most interesting information learned from either your research or that of your classmates?
- b. Do you believe that acid rain is a problem society has to deal with? How many don't? Why or why not?
- c. Did anything make you mad about the issue of acid rain? If so, why? Ask at what point during this project they thought to themselves, "That's not right" or "That's unfair"?)
- d. Can average citizens and middle school students help solve a problem such as this? How?

**Note to Teacher:** Ideally, for questions "a" through "c," students will address acid rain's effects on human health and the fact that affected populations usually live far away from the sources of the problem. Some might be angered by the fact that technological solutions to the problem are available, yet they are not implemented because of costs. As for question "d," some students will offer concrete actions such as ways they themselves can conserve energy to reduce emissions from coal burning power plants, automobiles, or other sources. Others may come up with the idea that we can vote for politicians who will act on the issue, or that they can write to public officials expressing their viewpoints. If students do not generate these latter approaches, prompt them to do so, and discuss the role of elected officials and our responsibilities as citizens. Emphasize that elected officials want to know what their constituents think, and that all of our voices count. This will set the stage for the final assignment of the unit, *Write a Letter*. Continue to follow any news related to energy and environmental issues, particularly those related to coal-burning power plants and acid rain.

5. Distribute the Handout #10a or #10b *Write a Letter!* homework assignment and explain that this will be the final segment of the *Killing Killer Rain* unit in Social Studies. It is an opportunity for each student to use his/her knowledge to help formulate a letter expressing his/her views to a public official about acid rain and the government's energy and environmental policies. If time permits, allow students to begin this assignment during class.

**Note to Teacher:** There are two versions of the *Write a Letter* assignment (Handout #10a and Handout #10b). In the Handout #10b assignment, students read several articles that address *Clean Air Act*, in addition to writing their letters. Version #10b is lengthier but offers more political context and content.

**Homework:** Give students two days to complete a first draft of the *Write a Letter* assignment.



## **Day Eleven: Complete the *Write a Letter* assignment**

**Description:** Students “peer review” letters written by their classmates. By doing so, they make suggestions for potential revisions and have an opportunity to read about the acid rain problem someone else’s perspective.

**Objectives:** Raise students’ awareness about environmental health issues that affect their lives. Encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches. Teach students how information can be used to solve a problem. Encourage student participation in and understanding of current events, public debate, civics, and advocacy approaches. Promote writing and public speaking skills through class presentations on group findings and recommendations.

### **Materials:**

- Letters that students have written for homework.
- One red pen or pencil for each student
- Handout #11 “*Write a Letter*” *Homework Grading Rubric*

### **Activities:**

1. Have students work in groups to proofread and provide suggestions on the first draft of the group members’ letters to public officials. Make sure students use a proper business letter format, correct spelling (including names) and grammar, and accurate addresses.
2. Give students one more day to revise their work and complete a final draft of their letters that are ready to be mailed to politicians.
3. Collect the letters on their final due date. Grade the letters as a homework assignment based on the revisions they made and effort. Students can earn up to 30 Homework Points for this assignment. (See Handout #11 “*Write a Letter*” *Homework Grading Rubric*.)
4. After the letters have been graded, provide envelopes and stamps for students to mail their letters. Have students address the envelopes in class and stamp them. Mail the letters for your students, and ask them to report back if they receive responses.