

Dangers Seen and Unseen: Water and Environmental Health

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for

My Environment, My Health, My Choices

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Dangers Seen and Unseen: Water and Environmental Health

EDITORS NOTE

This unit can be used by students in "regular" education classes in Grades 6, 7 and 8, and students with a variety of special needs with some modification. This unit is part of a larger unit created to be used by students in English for Speakers of Other Languages (ESOL) classes. However, the ESOL elements of the unit are not available to be posted yet. We are posting the core of the unit in the hope that a broad range of teachers and classes will benefit from this well-reasoned and stimulating approach to environmental health in the classroom.

ESOL teachers can present this unit to their classes by offering ample preparation work, particularly in the areas of vocabulary, research and the nature of pollution. The authors of the unit suggest that teachers work with their students on additional topics as well to prepare for the unit. These include exploring the nature of water, bodies of water, and geography. Such preparatory lessons are essential, they suggest, for ESOL students to grasp the world discussed in "Dangers Seen and Unseen."

INTRODUCTION

This environmental health unit was originally developed for the bilingual students in our urban middle school ESOL (English for Speakers of Other Languages) classes. The students took part in a variety of lessons, labs, and hands-on activities in order to become familiar with the various aspects of environmental health. Our primary goal was to encourage students to use their knowledge of an environmental health issue to take action to improve the environment, thereby improving their own health. Students were encouraged to make intelligent choices pertaining to the environment and to disseminate information.

A problem-based learning scenario, *Dangers Seen and Unseen*, was the focus of these student activities in which they explored the impact of water pollution on human health. The problem-based learning activities were used with both ESOL and regular education students. The students enjoyed the mystery of the PBL "story" and were very successful at analyzing the issues. We found that regular education students, special education students, and ESOL students benefit from the hands-on experiences. All students were engaged by the technology of creating PowerPoint presentations. We added a fieldtrip to the local science museum, a fieldtrip to a water treatment plant, and invited several guest speakers to help make the unit more real for the students.



In order to successfully use this unit with our ESOL students we also implemented additional lessons in essential language skills including grammar, conversation, reading, and writing. We introduced vocabulary and ideas through pictures, including engaging PowerPoint presentations, graphic flow charts, and graphic organizers. Using such visuals was helpful for all students, especially ESOL and special education students. Many of our students come from areas where they haven't had access to technology and school is their primary place to learn how to use existing Internet and computer technology. Daily computer use gave ESOL students access to technology while learning English through science. In addition many of our ESOL students have very limited knowledge of the geography of the world, the United States, or their own community in Rochester, New York. Students were introduced to the bodies of water and geographical features of this area. We also had students create a 3D model of Rochester to illustrate how the flow of polluted water into Lake Ontario can affect human health.

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UNIT OVERVIEW:

Day 1: The mystery story

Students read the first half of the *Dangers Seen and Unseen* and begin a Story Map.

- Handout #1 Dangers Seen and Unseen
- Handout #2 What Happened in the Story?
- Sample A: Story Map

Day 2: The mystery story continued

Students read the second half of the "Dangers Seen and Unseen" and complete a Story Map. They analyze what happens to each character.

Day 3: What could cause the illness?

The class works together to produce a concept map to illustrate what could have caused the mysterious illness.

- Handout #3 What Could Cause the Illness
- Sample B: Concept Map

Day 4: Choosing research topics

Students use the class concept map to identify research topics and then use www.worldbookonline.com to begin their research.

- Handout #4 Research Form
- Handout #5 Research Steps

Day 5: Research using websites provided by teacher

Students use Internet sources provided by the teacher to continue their research.

• Handout #6 Websites for Research

Day 6: Research using search engines

Students use Internet search engines to continue their research.

Days 7 and 8: Planning presentations

Students plan to share the results of their research through a PowerPoint Presentation

• Handout #7 PowerPoint Presentation Rubric

Day 9: Practicing presentations

Students practice their PowerPoint presentations with their partner.



Day 10 and 11: Presenting research

Students present PowerPoint presentations to their classmates and invited observers. They then reach consensus on the most likely cause of the mysterious illness.

GOALS:

Students will:

- Become more knowledgeable about how we affect our environment and how our environment can affect our health
- Gain research skills and experience
 - Using books, World Book Online, and search engines to find information
 - Use skills such as skimming and summarizing
 - Discuss information with peers
 - Learn positive and helpful ways to talk to group members
- Use higher-level thinking and problem-solving skills
- Understand and actively work to change policies or behavior that affect our health
- Disseminate information to friends and family



ACTIVITIES:

Day 1: The Mystery Story

Students read the first half of the mystery story *Dangers Seen and Unseen* and begin a Story Map.

Materials:

- Copies of Dangers Seen and Unseen (Handout #1) for each student.
- Large poster paper for each pair of students
- Markers for each pair of students
- Copies of What Happened to Each Character (Handout #2) for each student

Lesson Plan:

- 1. Distribute one copy of the PBL scenario *Dangers Seen and Unseen* (Handout #1) to students.
- 2. Students read pages 1 and 2 of the PBL scenario as a play or a class read aloud activity.
- 3. The teacher explains and models how to make a "Story Map." (See Sample A)
- 4. Distribute large poster-size paper and markers to pairs of students.
- 5. Students use the large paper and work with their partner to create a "Story Map" (story flow chart of the events) based on the scenario.
- 6. Distribute one copy of *What Happened to Each Character* (Handout #2) to each student.
- 7. Students read with partner and write down what happened to each character on *What Happened to Each Character* sheet.

Day 2: The Mystery Story Continued

Students read the second half of *Dangers Seen and Unseen* and complete the Story Map. They analyze what happens to each character.

Materials:

- Large poster-size paper for each pair of students
- Markers for each pair of students



Lesson Plan:

- 1. Students read pages 3, 4, and 5 of the PBL scenario.
- 2. Students work with partners to complete their "Story Map" (flow chart of the events in the story) based on the scenario.
- 3. Students read with partner and complete their *What Happened to Each Character?* sheets.

Day 3: What Could Cause the Illness?

The class works together to produce a concept map to illustrate what could have caused the students' mysterious illness.

Materials:

- Large poster-size paper for each pair of students
- Markers for each pair of students
- Copies of What Could Cause the Illness? (Handout #3) for each pair of students

Lesson Plan:

- 1. Distribute one copy of *What Could Cause the Illness?* (Handout #3) to each pair of students.
- 2. Partners brainstorm and information-map possible answers to the question, "What could have made the students violently ill?" They should be encouraged to relate their suggestions to specific parts of the story.
- 3. Class works with teacher to create a class concept map of possible causes of the student's illness. (See sample B)



Day 4: Choosing Topics for Research

Students use the class concept map to identify research topics and then use www.worldbookonline.com to begin their research.

Materials:

- Class concept map from previous class.
- Copies of Research Form (Handout #4) for each student.
- Copies of Research Steps (Handout #5) for each student.
- Access to Internet version of World Book, www.worldbookonline.com

Lesson Plan:

- 1. Class works with teacher to identify research topics using the class concept map of possible causes of the student's illness.
- 2. Partners choose a research topic.
- 3. Distribute copies of Research Form (Handout #4) to each student.
- 4. Distribute copies of Research Steps (Handout #5) to each student.
- 5. Teacher models how to find information on www.worldbookonline.com
- 6. Students use information from www.worldbookonline.com to fill in definition part of research form.

Day 5: Research Using Websites Provided by Teacher

Students use Internet sources provided by the teacher.

Materials

- Copies of Websites for Research (Handout #6) for each student.
- Access to Internet.

Lesson Plan

- 1. Teacher models how to find information using website links. Use Handout #6 that provides addresses for these sites. Teachers should feel free to make changes to the list of websites based on students' research topics.
- 2. Students use information from the websites to add more information to their research forms.



Day 6: Research Using Search Engines

Students use Internet search engines to continue their research.

Materials:

Access to Internet

Lesson Plan:

- 1. Teacher models how to find information using search engines. Go to search engine (www.dogpile.com or www.google.com or www.yahoo.com) and type in topic.
- 2. Students continue to find information using search engines and fill out remainder of their research forms.

Day 7 and Day 8: Plan PowerPoint Presentations

Students plan to share the results of their research through a PowerPoint Presentation

Materials:

- Access to computers with PowerPoint software.
- Access to Internet.

Lesson Plan:

- 1. Explain to students that partners will be presenting an oral report on the results of their research. They will be creating a PowerPoint to use for this presentation.
- 2. Students who have not had previous experience in creating a PowerPoint presentation will need extensive teacher guidance and support.
- 3. Discuss with students what makes a good presentation.
- 4. Distribute one copy of the *PowerPoint Presentation Rubric* (Handout #7) to each student.
- 5. Encourage partners to begin by using their research to make a list of the things that people should know about their topic. They can then select what they think the four most important or interesting things to include.
- 6. Encourage partners to use Internet to find pictures that they could use to illustrate their PowerPoint.



Day 9: Practice PowerPoint Presentations

Students practice their PowerPoint presentations.

Materials:

Access to computers with PowerPoint software.

Lesson Plan:

Students practice presenting their PowerPoint presentations with their partner.

Day 10 and Day 11: PowerPoint Presentations

Students present PowerPoint presentations to their classmates and invited observers. They then reach consensus on the most likely cause of the mysterious illness.

Materials:

- Copies of *PowerPoint Presentation Rubric* (Handout #7) for each student to evaluate each presenter.
- Access to a computer projector.

Lesson Plan:

- 1. Students present their PowerPoint presentations to the class.
- 2. Students evaluate student presenters using PowerPoint Presentation Rubric.
- 3. Ask class to reach consensus on what most likely caused the student's illness. Ask them to explain why they selected this cause.

Day 12: Planning for Action

Students make a list of possible pollution sources and things that citizens could do to reduce lake pollution. They plan a public service announcement video.

Materials

- Large sheet of poster paper for each pair of students
- Markers for each pair of students
- Copies of Public Service Announcement Video Project (Handout #8) for each student.



Lesson Plan:

- 1. Discuss that there are many possible sources of the pollution found in the nearby lake.
- 2. Point out that there are ways that average individual citizens can take action to reduce this pollution.
- 3. Discuss the importance of the public being informed about the pollution problems and informed about how they, as individuals, can act to reduce pollution problems.
- 4. Have partners brainstorm answers to the following question. "What can individuals do to reduce the amount of pollution in the lake?"
- 5. Share brainstorming ideas through a class discussion. List the class ideas on the board or on a poster.
- 6. Teacher provides one or two models of public service announcements.
- 7. Students should work with their partners to brainstorm answers to the following question: "If you were creating a public service announcement to tell people how to reduce lake pollution, what would your message be?" Consider what people should know and should do.
- 8. Partners select one of their messages for how individual action can reduce lake pollution.
- 9. Distribute one copy of *Public Service Announcement Video Project* (Handout #8) to each student.
- 10. Students work with their partner to complete the public service announcement video project sheet.
- 11. If time permits, work with students to create a class rubric for the public service announcement video project.

Day 13: Producing Public Service Announcement Videos.

Students practice and then videotape their public service announcement.

Materials:

Video camera for students to videotape their public service announcements.

Lesson Plan:

- 1. Students practice their public service announcements.
- 2. Teacher videotapes students' public service announcements.



Day 14: Viewing Public Service Announcement Videos

Students and other observers view public service announcement videos made by class members.

Materials:

- Video player
- Videos recorded in previous class

Lesson Plan:

Teacher shows students' videotapes to the class and possibly to invited observers.



NEW YORK STATE EDUCATION STANDARDS

Dangers Seen and Unseen: Water and Environmental Health correlates with the following New York State education standards:

NY State English Language Arts Learning Standards

- Standard 1: Language for Information and Understanding
- Standard 3: Language for Critical Analysis and Evaluation

NY State English as a Second Language Learning Standards

- Standard I: English for Information and Understanding
- Standard II: English for Literary Response, Enjoyment, and Expression
- Standard III: English for critical analysis and evaluation.
- Standard IV: English for Classroom and Social Interaction

NY State Science Learning Standards

- Standard 1: Analysis, Inquiry, and Design
- Standard 2: Information Systems
- Standard 4: Science
- Standard 6: Interconnectedness: Common Themes
- Standard 7: Interdisciplinary Problem Solving

NY State Social Studies Learning Standards

- 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, and global—including the distribution of people, places, and environments over the Earth's surface.
- Standard 5: Civics, citizenship and government
 Students will use a variety of intellectual skills to demonstrate their understanding of the necessity for establishing governments; the governmental system of the United States and other nations; the United States constitution; the basic civil values of American constitutional democracy; and the role, rights, and responsibilities of citizenship, including avenues of participation.



Dangers Seen and Unseen

A Mystery

Final exams were almost over and the students at Monroe High School were tired. It was boiling hot, and they were sticking to their chairs. Ugggh, it was so hot. Some students were already



finished with the math exam. It was almost 10 AM. Tamara and Freddy were fidgeting in their seats. They had finished the exam and were so ready to get out of school. Finally, the bell rang. They handed their exams in and walked out the door.

- "Wanna study for the science exam?" asked Freddy.
- "I'm too hot and tired," answered Tamara as she leaned up against the wall waiting for Whitney to come out of the classroom. Jose and Whitney were the next two to come out.
 - "Let's go down by the water and chill," yelled Jose.
 - "I have to study," whined Freddy.
 - "Just bring your notes," answered Jose. "We can guiz each other!"
- "We can pack a picnic lunch and soda," added Tamara. "Let's meet at my house." The decision was made and soon the four friends were off to the busses. They would go home, get their bikes and meet at Tamara's house. Everyone arrived about a half hour later. It would be the perfect picnic. Tamara's mom had neatly packed sandwiches in individual baggies. There were also Pringles, Starbursts, and cans of Coke in the plastic grocery bag.

The screen door slammed closed with a bang, and they were on their way. On Lake Avenue,



Freddy tried to jump the curb and his chain came off his bike. It took about 15 minutes to get it back on. They lost a lot of time. When they finally saw Lake Ontario, they couldn't wait to get wet.

"Let's swim," yelled Jose. "Last one in is a rotten egg! I'll race."

"I don't know how to swim," cried Whitney, "But I'm gonna get wet because I'm boiling." She stripped down to her bathing suit and ran in with Tamara close behind.

"I 've never seen so much floating trash! This is really gross," yelled Whitney as she stepped around a McDonald's cup and a plastic bottle.

"Yuck," added Tamara as she coughed on some water that she had swallowed by accident. Nevertheless, the water was refreshing. The boys stayed in awhile longer. They swam down the beach and back. The girls found a good spot on the beach to hang.



"Look" said Whitney. "See that stream. There is a big beaver lodge up there. I saw it once with my dad."

Tamara and Whitney pulled a small blanket out of Freddy's backpack, spread it out, and laid the food out on it.

"My family goes on picnics in the summer," declared Tamara. "We also go camping and hiking, but it always means carrying lots of gear. I get stuck carrying the ice chest all the time.

One time I got really sick. I threw up and stuff. It was nasty."

The boys came out of the water just in time to sit down to lunch.

- "I could eat a horse. What's for lunch?" asked Jose.
- "NO horses, just ham and mayo. We should eat it before it spoils," replied Whitney.
- "I gotta study!" Freddy said nervously. "I am gonna fail if I don't study!"
- "I started studying last week, so I can quiz you Freddy. Let's eat first. Here, take some

Pringles and a Coke," offered Tamara.



Freddy pulled his radio out of the backpack and turned it on just in time to hear the announcer declare, "Ozone warning is in effect..."

- "What's ozone again?" asked Freddy.
- "You don't even know that? Remember that movie we saw on ozone?"
- "Yeah, I missed that one," answered Freddy.
- "Well, you should have watched it," answered Whitney. "You miss too much school and you don't make up your work."

Freddy was quiet. He knew it was true and now he needed to get at least a B on the science exam.

"This Coke is warm!" Freddy said as he drank some of it from the can. "I'll put it in the water to get colder. The water is about 21 degrees Celsius."

"Oooh, how impressive," said Whitney. "At least you know your metric measurements."

Freddy walked further and held his Coke down into the water, making sure he didn't put the opening under the water.

"Just drink it," said Jose.

Freddy came towards the shoreline. "We should have brought ice packs," he said.
"Anybody want this last sandwich?" asked Jose before he gobbled it up. They are the rest of the potato chips and started cleaning up the trash.

"Ouch!" yelled Freddy as he stumbled in the water and dropped his Coke can into the water. "My foot is bleeding," he said as he drank his Coke hopping around on one foot. "Yuk, I got water in it."

- "I drank some water too," admitted Jose.
- "Me too," echoed the girls.
- "Well, if it's safe enough for those beavers up the stream, then it's safe enough for us,

right?" said Jose.



"I don't know," answered Freddy. "All I know is that my foot hurts, maybe a beaver bit me?"

The three friends rolled over laughing as they watched Freddy holding on to his foot and hobbling around.

"Does anyone have a band-aid?" Freddy asked.

"Yeah, right in my back pocket," joked Jose.

The girls became more serious as they inspected Freddy's foot.

"I'm pretty sure it was from one of those zebra mussels," said Whitney. "I've had the same thing happen. Just watch out for a bacteria infection. Jose, it's not that funny," she added as she glared at him.

"Okay, okay I'm sorry!" said Jose. "I hope you don't bleed to death." He added with a giggle.

"What's that noise?" asked Whitney as she pushed her hair out of her face.

"It is the wind. A cold front is moving in." answered Tamara. "We should go. It is going to storm soon. I don't want to get stuck in the rain."

"Hey, do you smell that?" asked Tamara. "Yuk, it smells like rotten eggs. The wind is carrying the smell this way. Look at all those huge barrels over there. At first I thought that one was a trash can, but there is black stuff all over it. The ground is all soggy too. Yuk."

"This place is giving me the creeps now," said Whitney.

"Let's go home before we get in trouble," said Freddy. "We should have obeyed the sign."

"Well, we didn't swim", said the girls in unison.

"Yeah, but you did go in the water and there are dead fish on shore over there," explained Freddy.

"I am getting a headache," complained Jose. "I t's so hot."



"My uncle got a bad head-ache when he had heat stroke, or maybe it was sun stroke," said Whitney.

The four students cleaned up, put on their backpacks and biked home. They were glad to get out of the sun and go home.

The next morning their science exam was at 8 am. Tamara walked into the classroom looking for the others. "Where's Freddy?" she asked Ms. White.

"Sick, as well as Whitney and Jose. Whitney was in the emergency room last night.

Apparently, they all went somewhere yesterday and all got sick from the same thing. Do you know anything about it?" questioned Ms. White.

Tamara didn't answer. She was thinking about the NO SWI MMI NG sign that they had ignored yesterday.





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What Happened to Each Character?



Write down what happened to each character of the mystery story.

Freddy	Jose	Whitney	Tamara
		1	







Name:		
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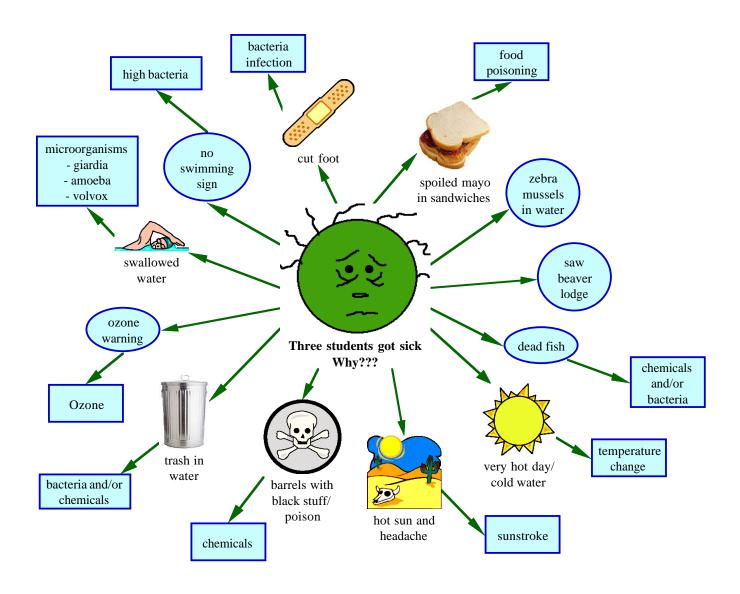
What Could Cause the Illness?

Write down your ideas for what could have made the students sick. Then, explain what part of the story gave you each idea.

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What are your ideas for what could	What part of the story gave you this
have caused the illness?	idea?



Sample B: Class Concept Map - Possible Causes of Illness





Name		

Research Form

Dangersseenand Unseen

What is your Research Topic:
Give a definition: • What is it?
What does it look like? (Draw a picture if you can.)
Causes: • What is the cause?
Why does it happen?



Effect on health:
 Does it affect human health?
Llaw daga it affact howard haalth O
How does it affect human health?
What are the symptoms?

Sources

• Where did you find the information?



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Research Steps



To research your topic, you should:

- 1. Use Encyclopedia resources online or in school library.
- 2. Use library books about topics in unit.
- 3. Use the internet.
 - Use Keywords
 - Use search engines such as:
 - www.dogpile.com
 - www.google.com
 - www.yahoo.com



Name		

Websites for Research



Micro-organisms

- http://ebiomedia.com/gall/drop/dropmain.html
 A Drop of Life This website illustrates ten different protists and pond microlife.
- http://net.unl.edu/wonderwise/12parasi/kidactivity/index2.htm
 Parasite Sleuth Describes common parasites and how they affect humans.
- http://www.cdc.gov/ncidod/dpd/parasites/giardiasis/factsht_giardia.htm
 This website details giardiasis, a diarrheal illness and focuses on how giardiasis is spread, its symptoms, and prevention.

Food poisoning

- http://kidshealth.org/kid/stay_healthy/food/botulism.html
 This website talks about Botulism, what it is and how to prevent it.
- http://kidshealth.org/kid/stay_healthy/food/food_poisoning.html
 This website talks about food poisoning, what causes food poisoning and what your doctor will do to help you if you have food poisoning.
- http://kidshealth.org/kid/stay_healthy/food/ecoli.html
 This website teaches us about bacteria and E. coli, a common type of bacteria. It also tells us how to prevent E. coli poisoning.
- http://www.keepkidshealthy.com/welcome/infectionsguide/foodpoisoning.html
 This website has more information on food poisoning

Bacteria

- http://www.amnh.org/nationalcenter/infection/
 Infection, Detection, Protection This website contains information and fun, educational games on microbes, bacteria, infection, prevention and the flu
- http://www.microbe.org/microbes/bacterium1.asp
 Go and explore microbes with microbiologist Sam Sleuth. He will teach you all you need to know about microbes and how we use them to help humans.



Zebra mussels

- http://www.rnews.com/Story.cfm?ID=11053&rnews_story_type=18
 An article on Zebra mussels in Seneca Lake.
- http://dnr.wi.gov/invasives/fact/zebra.htm
 This website teaches us about zebra mussels. It also describes how the introduction of the zebra mussel has affected native mussels in the Great Lakes.

Heatstroke

http://science.howstuffworks.com/question699.htm
 This website tells us about heatstroke, what can cause heatstroke, and what to do if someone has heatstroke.

Ozone

- http://www.lungusa.org/site/apps/s/content.asp?c=dvLUK9O0E&b=34706&ct=67878
 This website gives us facts about the ozone
- http://www.atm.ch.cam.ac.uk/tour/
 This website takes you on a tour of the ozone layer and the loss of ozone over
 Antartica

Acid Rain

- http://www.epa.gov/airmarkets/acidrain/effects/index.html
 This website describes the effects of acid rain on surface waters, forests, visibility, and human health
- http://www.epa.gov/airmarkets/acidrain/
 This website teaches us what acid rain is and how to prevent acid rain.
- http://www.epa.gov/acidrain/site_students/
 This site has more information on acid rain, fun acid rain games and a glossary of acid rain terms.

Water pollution

http://ehp.niehs.nih.gov/members/2005/113-3/focus.html
 The changing environment of the Great Lakes – How pollution and changes in weather are affecting the Great Lakes.



- http://www.lenntech.com/Water-Pollution-FAQ.htm
 This website answered the questions what is water pollution, what are the major water pollutants, and where does pollution come from.
- http://www.oneworld.net/penguin/pollution/pollution_home.html
 Tiki the penguin takes us on a journey through the smells, sights and sounds of pollution.

Environmental Action

- http://www.epa.gov/adopt/
 Adopt Your Watershed How we can protect the watershed around where we work, live and play.
- http://www.uwex.edu/erc/gwah/
 Give Water a Hand. How young people can get involved in their community to make their water safer and cleaner.

Bodies of Water and Watersheds

- http://cfpub.epa.gov/surf/locate/map2.cfm
 Surf Your Watershed Choose your state and you will find environmental information on the watershed in your state.
- http://www.epa.gov/students/water.htm
 Learn about America's wetlands, acid rain, and other bodies of water



Name		
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PowerPoint Presentation Rubric



Directions: Rate the student PowerPoint presentations. Give 1 point if the presenter completed the task. Give 0 points if the presenter did not complete the task. Fill out a rubric for each presenter.

Presenter's Name:	
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Points (0 or 1)	Task
	Speech is clear, "lively" and audible (everyone can hear and understand the speaker)
	The speaker begins their presentation promptly and continues without interruption.
	Presents 4 facts about the topic.
	Uses 4 slides with photos, pictures or diagrams/charts.

Total Points (0 - 4	4) :	
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Name _____

Public Service Announcement Video Project



Names of your team members:

What is your message?			
What is the format? Rap, Interview, Show and Tell, Dance, or Other (describe)			
What is each team member's role in this project?			



Write a script for your public service announcement.				