

Pittsburgh: Things That Aren't There Anymore and Why They Are Gone.

By Virginia R. Hill

Oliver High School- Biology

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Overview

Just the thought of it brings a soothing calmness over me, lush green dewy light, flooding the forest like the sun through a stained glass window on a Sunday morning. Moisture begins to bead upon my face and chest. Insects are whizzing past my head, with quick vibrating humming sounds. Some of these insects I have never seen before. Camouflaged in the vegetation are even more insects, snakes, lizards, and birds. My eyes close again and I am in a completely different setting. The white, hot, sandy beach scorches my feet, as I try to scurry along to avoid the pain. The wind softly blows across my face, with a warm suffocating breath, as the sun kisses my skin with its gentle rays. The sky burst forth with its rich blue hue that is complimented by the deep blue sapphire glistening from the ocean. The water is slightly cooler and completely refreshing as I immerse my body in it to examine the bounty of life, that is hidden beneath its blanket of fluid. The colors below the water are breath taking, rich, and vibrate, solids and patterns. Coral reefs provide a home for an abundance of aquatic organisms rich, colorful, and diverse. Some move fervently along the ocean bottom, while others appear ambling along in such of their next meal. It is so apparent, that there is a vital living ecosystem under the sea. With the close of my eyes, I find myself inside a boat. The area is a damp, marshy, lowland inlet. There are rich emerald water lilies, algae and diverse plant life. Trees sit out of the water majestically, on their roots, like living monuments to all life our planet. Birds find this lush habitat as a haven to nest and thrive. Crocodiles live out their predatory existence as the sound of crickets provides a living harmony for the organisms of this habitat. If only I could have my students imagine these locations with enough fervor to understand global issues and dilemmas. Sometimes a video helps, but often its memory fades as fast as the video rewinds.

Ecology is often focused toward the rainforests, coral reefs, and wetlands. Through defining our own living spaces as environmental spaces, we can shape the way we perceive our surroundings and thus change unhealthy behaviors toward the environment. A unit about Pittsburgh, places students pass while riding the slow crowded buses or see as they stroll down the uneven cracked pavement, in their neighborhood, would hit home. This unit could become an environmental

"Things That Aren't There Anymore" (Mills, smoke, pollution, jobs, and major communities). This unit will offer students a meaningful glance at Pittsburgh's environmental history and a vehicle to become apart of Pittsburgh's environmental future. Even though this unit appears as the third chapter of the major text, I would like to introduce this unit at the end of the year. Pittsburgh is a wonderful area and teaching tool to begin an ecology study. Pittsburgh has a rich history as an area with a tremendous wealth of forests, mountains, and rivers. Students can examine the ways in which the founders of the Pittsburgh area exploited the resources in the environment, how the surrounding environment was affected, and attempts to regain the beauty that was lost during the Industrial Revolution.

Rationale

My rationale to place this unit at the end of the school year is based on the fact that students have covered key topic, such as, cells, plants, and animals. Students will have a basic knowledge of biotic, abiotic, trophic levels, and symbiosis. These concepts will help students better comprehend the Ecology unit and its various projects. The goal of this unit is to involve students in the already global effort, of saving our planet, for future generations. Students will be made aware of daily practices and habits to incorporate into their daily lives. Students will also address various content standards, of the Pittsburgh Public Schools, that are listed in the Pittsburgh Public Schools Biology Course Study and in the Appendix at the end of this unit. This unit was designed for my tenth grade, mainstreamed classes in mind, from the Biology: Dynamics of Life text, Chapter three.

Objectives

In this unit, students will distinguish between biotic and abiotic factors in the environment. This will allow student to see that living and non-living factor play an important role in the balance of an ecosystem. Students will compare the different levels of biological organization used in ecology. This will allow students to observe that every organism has a niche or place in the environment, and when one organisms takes too "much" space and/or resources it often leaves a negative impact on the rest of the environment and organisms in that environment. Students will also explain the difference between a niche and a habitat. Students will see how the Industrial Revolution has affected the habitat in the Pittsburgh area. While we progressed financially during the Industrial Revolution, we regressed environmentally. These objectives will help students to achieve the environmental standards, by describing the components of an ecological system and their functions. We will analyze social systems, behaviors, and technologies role in the Industrial Revolution and explain the relationships among science, technology, and society. Students will also, explain the matter and energy relationships shown by ecological pyramids, and compare and contrast the ways nitrogen, carbon, and water cycle through biotic and abiotic parts of the biosphere. This will help students to conceptualize how pollution from the Industrial Era has helped to deteriorate the environment in the Pittsburgh area and examine why reclamation programs are a vital part of our future. This will allow students to evaluate the advantages, disadvantages, and ethical implications associated with the impact of science and technology on current and future life, which is a part of the standards based education program.

Strategies and Classroom Activities

To begin the unit we will examine photographs, from the textbook, Biology: The Dynamics of Life pages 52 and 53. The students' attention will be directed to the photographs and captions on page 53. I will ask a student to read the captions and ask all other students to listen carefully and examine the photographs. I will ask students: Are humans able to survive independently of all other organisms (Biology 53)? This picture displays several airplanes, flying over a housing complex that appears to have been destroyed by some natural catastrophe, like a tornado or hurricane. As the planes fly over, the caption explains that they are spraying chemicals that kill mosquitoes (Biology 53). Hopefully, students will be led to realize that like all organisms, humans are unable to exist without some dependence on other forms of life (Biology 53). In the next step, we will expand the discussion by asking do humans depend on non-living matter? At this time, I will solicit the students for examples of non-living matter that students depend on and write their answers on the board. Again students are led to realize that humans are dependent on non-living parts of the environment. Students will finally end this exercise with a guided reading activity. This activity will use blocks of text with missing words or phrases. Students must read the text to fill in the blanks appropriately. The intention of this exercise is to allow the students to familiarize themselves with the key terms and concepts of Chapter Three, Section One- Ecology: Principles of life, from the Biology text. The guided reading worksheet can be found in the appendix at the end of the written unit, and is labeled- Section 3.1 Organisms and Their Environment.

On the second day, the students will review the concept of organisms' interdependence and the key concepts (ecology, biosphere, biotic factor, abiotic factor, population, community, ecosystem, niche, and habitat.). In our first activity, students will be asked to list the living things a squirrel would encounter during a typical day. Students will speculate about the role of the organisms in the squirrel's life. The students will repeat the task for non-living objects a squirrel would encounter. We will discuss some of the responses. This activity would be used to point out that the needs of living things are provided by their environment (Biology 54).

During days two and three, students will go to the library to use the text, Pittsburgh: The Story of an American City by Stefan Lorant, to examine Pittsburgh's topography, population, and culture before and after 1776 on through to the Industrial Revolution. Our library has several copies of this book, which has a great pictorial guide of Pittsburgh's topography, population statistics, and culture during the above named era. Students will use a Worksheet that guides them through the changes in Pittsburgh's topography, population statistics, and culture from 1776-1900 (Chapters 2-6). The purpose of this activity is to have students examine specific ways humans who inhabited the Pittsburgh area, interfered with the ecology of the area. Students will also get an overview of how human actions impact an ecosystem. We will openly discuss situations that the students have observed in the pictures, which will prepare us for the lecture/slide show from the Pittsburgh's History and Landmarks Foundation. This activity will provide some interest to the students, being that this is the history of our city. Students will observe a lush river valley change into a bustling city that uses all of its natural resources (rivers, trees, coal, and clay) for human consumption without giving thought to the plants and animals that cohabit the area. Students will be given a list of plants and animals that surrounded the Pittsburgh area before and after the Industrial Revolution. Students will examine the issue, has industry helped or harmed

Pittsburgh's environment? Has preserving the environment ever been an issue in our area? The worksheet for this library exercise will be found at the end of the unit in the appendix. The Worksheet is labeled as- Pittsburgh: The Story of an American City, by Stephan Lorant.

The third part of the unit will include a guest speaker from the Pittsburgh's History and Landmark's Foundation. Students will take an in-depth look at Pittsburgh's industrial past. Through historic drawings, advertisements, engravings, and photographs, students will learn about the industries that helped make Pittsburgh the "Workshop of the World". After the slide show students will address the following bioethical questions that relate to Pittsburgh's industrial past. Should plants and animals be considered on the same level of importance as humans? Is earth merely for human consumption? What do you think is the current philosophy concerning plants and animals? How has this philosophy affected the environment? Students will break into small groups to first answer these questions for about fifteen minutes. This will hopefully expose students to other worldviews. Students will work on providing facts to answer their questions in their groups. Each group will share their answers to allow students to review the slide show and agree or disagree over the discussion questions with evidence, gained through knowledge acquired through the Ecology unit. This activity will help students to view the use of natural resources in Pittsburgh's past and allow them to make intelligent decisions (through voting and personal actions) in Pittsburgh's environmental future. Students will also be to write a written thank note to our guest speaker, pointing out a specific aspect of his/her lecture that was of interest to them, and express their appreciation for the time and energy spent to share their knowledge of the Pittsburgh area.

As soon as the unit begins, students will begin the major project, which will take approximately six weeks (during the spring months) to complete. This unit will be completed during the spring, so that students may observe plants and animals in their habitats and reinforce ecological concepts. Before we start any project to improve the habitat, we will write letters to the Pittsburgh's Parks and Recreation Department to inquire about ongoing projects or of creating a project in River Park or in Uniondale Cemetery. I would like students to participate in a clean up operation, planting flowers and other outdoor projects. Our school has a garden area, however the teacher in charge of this space is unwilling to share it.

Hopefully, we can become involved with the park or cemetery and work within an existing program. We will obtain all permissions needed for student to first take surveys of plant and animal species, and next work on some sort of clean up or restoration project. We will allow at least two weeks for site selection and species plant inventory, two weeks to gather information about site improvement projects, and at least two weeks to carry out our plan for a total of six weeks. The students will be divided into workable teams to survey species at the chosen site (plants and animals). Each group will make a realistic list of what they will need to carry out the clean up/restoration, including gear, clothing appropriate for the rigors of the terrain and weather conditions. The students will compare and review lists before we actually go outdoors. Safety and appropriate behavior will be encouraged. We will divide our work site into quadrants for each group to work in. Students should demonstrate a willingness to work cooperatively and divide responsibilities equally for conducting their plant and animal surveys. The survey should reflect thorough planning; its documentation and presentation should be clear and suitable for us as a nature guide to the site. We will use a digital camera, to take pictures of our area to make

pamphlets of our site on the computer. Students will demonstrate competence and effective communication skills in writing their pamphlets. Some students may develop an ongoing collaborative with the park/cemetery. Students will spend an extra three days to a week in the computer lab completing their pamphlets according to the rubric for the student outdoor pamphlet.

One of the species inventory activities will include the classification of trees in our outdoor area. The goal of this activity is to collect leaves of trees common to the area that we are studying (Person 12). We will identify the trees using references. Lastly, we will develop a classification system, which can be used to identify trees in a selected ecosystem. We will use the tree identification booklet (*A Golden Guide* by Zim and Martin), leaves and masking tape. We will begin our activity by speculating about the trees that were in our area before the industrial revolution in various locations. Most of our information will come from the Pittsburgh book used earlier, from sells reports of the different types of woods logged in this area. This service may also be provided by a member of the City Parks Departments or by Kathy McGregor (Kathy is a part of the Pennsylvania Forestry Department). Kathy has slides and an in-depth knowledge of plant species before and after the industrial revolution. We would like to see if biodiversity has been lost or increased since the industrial revolution. However, it may serve a better purpose to have someone from our collaboration with the outdoor space to areas and species of interest. It would also be beneficial to have a collection of leaves from our area, to be inventoried and examined, to give the students a prior knowledge of the trees in the area. This will also allow the lesson to flow a lot smoother when we are classifying the trees in our area. Students will be broken into groups and given a plot in a wooded area. Students will be asked to determine how many of each species of tree exists in their plot. Students should identify each tree in their plot.

We will collect the data, take it back to the classroom, place all the data from all groups and classes into one large data table and begin to draw conclusions about biodiversity (Person 13). We will also safely and carefully examine the animal species that exist in the trees, under rocks, and in the water (if available) and in the soil. We will also make data table for the animal species from our outdoor space to share between the classes. Part of the laboratory rubric can be found in the appendix label- Outdoor Restoration Rubric. The actual lab activities can be found in the Environmental Science Investigation work booklet, by Jane Person, on pages 12 and 13.

In this activity, students will watch the video "The Richest Man in the World: Andrew Carnegie". Students will once again address the bioethical issue of a pursuit of happiness and wealth versus protection of our environment. Students will examine the rags to riches life story of Andrew Carnegie, and his impact on Pittsburgh's economy, environment, and population. Students will work on a reflection questions and an essay after the video. Students will also address his philanthropy and speculate to reasons why Mr. Carnegie gave away such a vast fortune. Students will observe Andrew Carnegie as a complex individual, who was haunted by his scrupulous means of gaining wealth. Mr. Carnegie gave a library system to his workers, undoubtedly because he felt as though he owed them, more than he paid them. Students will examine the one environmental act of Andrew Carnegie. They will see how he bought the pristine park of his boyhood neighborhood and gave it back to the people in that area of Scotland.

Students will also speculate about what organisms were displaced (the destruction of habitats, the biotic and abiotic factors in the environment during the industrial revolution), by the building of steel mills and railroads. Students will also write an essay/mini grant proposal. Students will be told (from the video in particular) that Mr. Carnegie gave away billions for the Carnegie Library Network. If the students had a chance to ask Mr. Carnegie for an "environmental grant" what would they propose. How would they persuade Mr. Carnegie into giving them the money instead of or in conjunction to a library system? Students must come up with an environmental plan that would also keep employment for local residents and focuses on the Pittsburgh area. The video is two hours long and would be shown on the two days, that students have a double period lab. The reflection questions can be found in the appendix and are labeled as- The Richest Man in the World: Andrew Carnegie, Reflection Questions. Students will be asked to write their persuasive essays according to the rubric found in the appendix. This rubric explains how the paper is to be written, as well as, the content to be included in the persuasive essay. The persuasive rubric is labeled in the appendix as- Writing Exhibit: A Persuasive Essay. Major parts of the rubric were provided by the New Standards High School English Language Arts Portfolio Entry Slip.

In the next activity, students will examine several natural communities and be introduced to the different levels of producers and consumers. Students will watch two fifteen-minute videos and complete video a video sheet that asks questions pertaining to the video. The second video is about the soil community. This video discusses the chemical and mineral components that combine to make the soil. It also examines soil as a habitat, identifying the various organisms that live in the soil. They will also assess the contribution of soil organisms to soil's ecology. This activity will help to clearly define some key concepts and terms that are covered through out this unit. The videos are a bit dated, however, they do provide a visual insight into such terms as, niche, consumer, producer, and food web. The video will be viewed with a video sheet that will keep the students focused and engaged while they watch the video. The video sheet is geared towards highlighting key concepts, that can also be found in the textbook and that have also be highlighted through out the unit. The video sheet can be found in the appendix and is label as- Ecology Videos.

This information correlates directly with section 3.2- How Organisms Interact. Energy is necessary for the survival of all organisms. The ways in which living things obtain energy and how it passed from one organisms to another via feeding relationships (food chains and food webs) is an important to address when looking at organisms in the Pittsburgh Area during the Industrial Revolution. This section concludes with the discussion of the nitrogen cycle, the carbon cycle, and the water cycle. We will address how the Industrial Revolution affected these cycles in an adverse way. We will examine the role of carbon dioxide in the changing of climate in the Pittsburgh area. We will also address the massive use of water in urban settings and its affect on the water supply, for all human beings on this planet. We will examine the use of fertilizers and their affect on the water supply. We will address healthier ways to fix nitrogen in the soil for plant use. Students will also be asked to pick one of the above cycles, to make a poster size drawing of the cycle of their choice. Students must include their role in the cycle, as well as, the biotic and abiotic features to the cycle. Some ideas for drawings can be found in the

Biology text pages 75, 76, and 77. We will display the drawings in the hallway and classroom. Students will write a brief description of what occurs in their cycle.

In the next section 3.2, students will examine how organisms interact. Students will discuss the relationship between food and energy. Students will also address trophic levels, ecological pyramids, and biomes. To open up this section of chapter three, students will be asked to explain why they can maintain a constant body temperature during the summer, fall, winter, and spring, despite changes in the temperature of their surroundings. We will hopefully conclude, after discussion, that humans are endotherms. We will be able to gather a definition of endotherms, from the sections of the text that discuss the characteristics of an animal. Endotherms will be defined as being an animal able to maintain a constant body temperature, based on metabolic processes, rather than being regulated by environmental conditions. This will relate back to an organisms ability to maintain homeostasis in various environmental conditions. Organisms that can maintain homeostasis in various environmental conditions are those we consider "fit".

The next question I will ask students is, where does the energy needed to maintain a constant body temperature come from? Students will be led to identify food as the source of energy used to maintain body temperature and all other body functions- homeostasis. Students will relate this information to the loss of habitat and organisms to the loss of their food source. To review and familiarize students with the key terms of this section, students will complete a puzzle. This puzzle was created on line, in the Puzzle Maker. The Puzzle Maker is a part of Discovery Schools dot com. The web address can be found in the Works Cited Section of this paper.

In the next activity, students will also be asked to get a personal, historic view of the past. This activity will hopefully give students insight about the sources of energy and the energy related technology used by people during the first part of the twentieth century. Students will be asked to identify someone who was living in the early nineteen hundreds (who can remember coherently). Students will gain this individuals signed permission to conduct an interview. With their permission students will also be asked to take a photograph of the person to be interviewed (cameras can be loaned to students who need them). Students will ask the individual to share their experiences about what life was like when they were young. If a student cannot find an elderly person, at least eighty plus years old, I will ask them to interview their grandparents, an older relative, an older teacher or a parent who has knowledge of the Pittsburgh area during its Industrial hey day. During the interview, students will be asked to ask questions about the sources of energy and the energy related technology, which was used. There are some suggested questions in the activity laboratory workbook, Ecology Investigations 3.5, which has been included in the appendix and is labeled as- A Glimpse of the Past. Students can also ask other questions that they feel are important, without becoming too personal. Students will be reminded not to rush through the interview, but allow the person plenty of time to respond to each question.

While my grandmother was living we often spent many hours talking about her life and the activities that she performed. Her strength and integrity mesmerized me. Our talks made me fall deeper in love with her and I carry a deep respect for her as an individual. Young people should

be reminded that if they live long enough they too would get older. Respect for the elderly in our society is a beautiful gift and it is our duty to pass this gift on to the future generations. We will use the computer to make magazine articles, based on each person interviewed. We will put the articles together into a class magazine, that will be distributed to each person interviewed, the students who participated in the interviewing, the faculty and staff.

We will begin to wrap up our unit with a field trip to the Pittsburgh Water Treatment Facility. Students will examine the fact that almost three-fourths of the earth's surface is composed of water, but most countries do not have enough water to carry out daily tasks, that we take for granted. Students will see that in many areas people do not have indoor plumbing and must walk great distances to obtain clean water. Students will also examine the tragedy that many countries do not possess any or possess primitive water treatment facilities and the major cause of death across the world is dehydration caused by diarrhea, because of contaminated water supplies. Ninety eight percent of the water on this planet is "fixed" in oceans, glaciers, ground water, lakes, reservoirs, plants, animals, and the atmosphere. Groundwater is our main source of water. Many countries have gone to war over the use of water and dams. All countries are faced with the dilemma of how they will increase their water supplies. Students will see that the population of an area is directly related to its ability to maintain a steady water supply. Students will see how the water supply is being depleted and polluted. Students will use an excerpt from Environmental Science: A Global Concern pages 424-429 that will touch on all these issues. We will also look at past statistical data that will show the increase in urban areas also places a greater demand on clean water supplies.

After we have examined some important water issues, we will look at the various locations of Pittsburgh's water pumping stations and why they were moved to their present location on the Allegheny River. The Pittsburgh Water Treatment Facility will provide a tour of their building with a history and background of Pittsburgh's water supply history and the importance of the three rivers. Students will be asked to take notes during our field trip and compile them into a response to their opinion of their field trip. Students will also examine the laboratory features to the Water Treatment Facility. Students will observe what the scientists are actually looking for in the water. This is another means of providing care for the environment. If toxic chemicals are being dumped into the environment, they can be detected by the Water Treatment Facility. After this detection, the Water Treatment Facility will contact the necessary authorities, so that an investigation can begin. In many instances, companies have been fined heavily and shut down because of illegal dumping. Students will get a first hand view of pollution and how it affects the water supply. This will hopefully bring the issue closer to home, when students can see that careless actions can pose a threat to everyone's water supply, including their own.

We will conclude the outdoor project and compose our pamphlets, put together our magazine and review the activities that we completed in this unit. Hopefully, by the end of this unit, students have gained a pride in their achievement, a sense of community pride and an appreciation for our natural resources and the environment. Students will hopefully, be in a

position to make wise environmental decisions for themselves and future generations. Students will see that nearly half the people in the world now live in urban areas. Some of the most severe environmental problems in the world are found in giant mega cities, of developing countries. Lives are being threatened by desperate environmental conditions in these cities, more than any other factor. We have got to equip our children and future generations with the knowledge necessary to handle these problems. Without this knowledge people will perish in great number and as quiet as it is kept, people are ailing and diseased, because of the toxic environment. Through this unit, students will hopefully come to see that the land is an important resource that should serve the needs of plants and animals, as well as humans (Biology 53).

We have traveled through the thick, dark, dusty haze of Pittsburgh's Environmental past. We have walked along side of the sweaty, sooty, tired steelworkers. We have looked at Pittsburgh through the eyes of one of its weary survivors and seen their desperate struggle to forge out a living in Pittsburgh's rugged terrain. We observed the loss of majestic trees in pristine forests and watched organisms struggle to maintain their life in an ever-changing habit. We mourned the loss of so many species native to our area that may never return. We have seen attempts to right the wrongs done to the environment in the Pittsburgh area. Pittsburgh has lost so much of its original, delicate beauty that drew the French and the British to this area. It's so sad that neither country saw this area for what it was, a beautiful gift of God. The founders of this area made a terrible mistake, by just looking at Pittsburgh as a means to create wealth. Carelessly, trees were cut down, mines were dug out, and air and water were polluted, for material goods that have since passed away and money that never really benefited anyone in this area. The people, who polluted the Pittsburgh area to make money, often moved to another place more appealing to the senses. We who are left behind have the responsibility to not allow history to repeat itself. We must teach this generation and future generation the importance of caring for the environment. The environment must be seen as more than a way to get rich. Other organisms that coexist with humans must be seen as valuable. We cannot allow others to continue to misuse the city in which we live. We must preserve what we have for future generations. We must remember our children. All of us want to leave the earth, knowing we have left our children financially stable. We must also leave our children with a safe, clean, earth to be environmentally stable. What are we teaching our children?

Annotated Bibliography/Resources

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Carson, Rachel. Silent Spring. Houghton Mifflin, 1962/1994. Addresses the effects of pesticides on all life on earth.

Discovery Enterprises, LLC. Puzzles and Mazed Things™ mazes Copyright © 1998 Network Solution Developers, Inc. www.puzzlemaker.com. April 22, 2001. Web site that generates puzzles for all content areas.

Bell, Thomas. Out of This Furnace: A Novel of Immigrant Labor in America. University of Pittsburgh, 1976. A novel that addresses the life of a Steelworking family during the Industrial Revolution.

Pittsburgh's Industrial Past: Pittsburgh History and Landmarks Foundation, slide show. Through historic drawings, advertisements, engravings, and photographs, viewers learn about the industries that helped make Pittsburgh the "Workshop of the World."

Materials List For Classroom

Person, Jane L. Environmental Science, How the World Works and Your Place in It. Lab Manual. Ronkonoma, NY: LeBel Enterprises, 1989. A laboratory guide that includes various environmental and ecological activities.

Lorant, Stephan. Pittsburgh: The Story of an American City. Garden City, NY: Doubleday, 1964. A pictorial guide through the tumultuous discovery and founding of the Pittsburgh Area.

"The Richest Man in the World: Andrew Carnegie." The American Experience. Narr. David Ogden Stiers. Writ. & Dir. Austin Hoyt. PBS. WGBH, Boston. 1997. This video narrates the life and times of Andrew Carnegie, from poverty to prosperity.

Cunningham, William P. & Barbara W. Saigo. Environmental Science: A Global Concern. 4th ed. Boston: McGraw-Hill, 1997. This text reflects on the major categories of material in environmental science.

"The Community", Encyclopedia Britannica, video, 1944. Examines the relationship between food and energy, and also expands to include ecological pyramids, trophic levels and biomass.

"Soil: A Natural Habitat", Encyclopedia Britannica, video. Discusses the chemical and mineral components that combine to make soil, identifies various soil habitats and organisms, as well as their contribution to soil's ecology.

Zim, Herbert S. & Alexander C. Martin, Trees: A Guide To Familiar American Trees. New York: Golden Press, 1987. A pictorial guide to tree identification.

Reading List for Students

Gross, Virginia T. The Day It Rained Forever. New York: Viking, 1991. A story of the Johnstown Flood.

Carson, Rachel. Silent Spring. Houghton Mifflin, 1962/1994. Addresses the effects of pesticides on all life on earth.

Biggs, Alton et al. Biology: The Dynamics of Life. Ohio: Glencoe/McGraw-Hill, 1995. A course study that follows a phylogenetic approach in its organization of biology.

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Appendices

The following section includes the Appendices. The Appendices contains all the assignments and standards that are listed throughout the Principles of Ecology Unit. The Biology Dynamics of Life Curriculum includes many assignments not included in this unit that may be helpful when presenting this unit to students. The Biology Dynamics of Life Curriculum includes chapter assessments, study guides, bio labs, laboratory exercises and other activities. It also contains Rubrics and Portfolio Assessments. The assessments that I have chosen for this unit are both conventional and standards based. Some of the assignments in the appendix may include rubrics and are standards based, which makes them able to be included in student portfolios.

Appendix A – Assignments

Name _____ Date _____ Period _____

Section 3.1: Organisms and Their Environments

The Beginnings of Ecology

Many people make a hobby out of observing and studying _____ and _____ in their natural habitats.

_____ help these people identify different species of plants and learn about a plant's _____ and flowering times. In order to find new birds, bird watchers listen for bird songs and investigate all types of _____.

Natural history led to ecology

The _____ of natural history is to find out as much as possible about living things.

The branch of biology that developed from natural history is called

_____.

Ecological study reveals interrelationships between _____ and _____ parts of the world.

Using descriptive and quantitative methods of research, ecologists can learn a great deal about _____, such as how day length influences behavior of migrating birds, how tiny shrimp help rid the _____ fish of parasites, or how _____ threatens some of Earth's forests.

The living environment: Biotic factors

TRUE OR FALSE: As far as we know, life exists only on Earth.

Living things can be found in the air, on land, and in both fresh water and salt water. The _____ is the portion of Earth that supports life.

Many different environments, both _____ and _____, exist in the various regions of the biosphere. Each environment includes _____ and _____ factors that affect the organisms living there.

Define Biotic Factor _____.

The nonliving environment: Abiotic factors

Ecology includes the study of features of the environment _____.

Define abiotic factors AND GIVE FIVE EXAMPLES.

Abiotic factors can have obvious effects on living things and often determine which species _____.

Levels of Organization: The Hierarchy of Life

All _____ depend on others for food, shelter, reproduction, or protection. So you can see that the study of an individual would provide only _____ of the story of its life cycle.

Ecologists study how _____ affect groups of interacting species.

Interactions within populations

17. Define Population _____
_____.

18. Members of the same _____ compete with one another for food, water, mates, and other _____.

19. IMPORTANT READ PAGE 59.

20. Some species have _____ that reduce competition within a population.

Individuals interact within communities

21. No population of organisms of one species lives _____ of other species. Just as a population is made up of individuals, a _____ is made up of several populations.

22. Define community _____
_____.

23. A dramatic change in population can occur, when the size of one population grows so large it begins affecting _____
_____.

Interactions between living things and abiotic factors form ecosystems

24. Describe a healthy forest community. _____

_____.

25. An _____ is made up of the interactions among the populations in a community and the community's physical surroundings, or _____.

26. List four different ecosystems _____
_____.

Where and how organisms live

27. Every species has a particular _____ in its community.

28. Define Niche _____
_____.

29. The space, food, and other conditions an organism needs to survive and reproduce are part of its _____.

30. A _____ is the place where an organism lives out its life.

31. Although several species may share a habitat, the food, shelter, and other resources of that habitat are _____ into separate _____.

32. The differences in food, materials, and times, leads to distinct _____ and reduced competition.

Name _____ Date _____ Period _____

PITTSBURGH: The Story of an American City, by Stephan Lorant

DIRECTIONS: *We will use this text to research Pittsburgh's topography, population, and culture before 1776 through the industrial revolution.*

Part One

Observe the Map on pages 62 and 63.

List two things that appear on the Allegheny and Monogahela Rivers that are not here today.

Identify at least three streets that are still apart of Downtown Pittsburgh today.

What year does this map represent? _____.

Part Two

Examine the two paintings on page 65. Then read the second column of page 52.

What was the attitude of Hugh Henry Brackenridge towards the Pittsburgh Area? Briefly, How does he describe the Pittsburgh Area?

Does he show any concern for plant or animal life or natural resources?

What year is this? _____

Part Three

Examine the drawing on page 80.

What do you notice about Pittsburgh's mountains and shorelines that are different from the Pittsburgh of today?

What year is this?

Part Four

Observe the drawing on page 113.

How is this drawing different from the one on page 80? (Specifically note the mountains and shoreline)

What year is this?

Part Five

Examine the drawing on page 126 and 127.

How is this picture different from the rest we have looked at?

What do you notice about:

City? _____

Rivers? _____

Mountains? _____

Part Six

Observe the pictures on pages 146-147.

How is the air being polluted?

How is the water being polluted?

Explain what is happening to Pittsburgh. (Is it increasing? Why or why not?)

What is the role of plants and animals in this painting?

What year is this? _____

Part Seven

Examine the Mon Warf.

Is there a lot of vegetation on the shoreline and on the mountains? Why or why not?

What year is this? _____

Part Eight

Notice the rivers and shoreline.

1. Do you think that plants and animals are being considered during Pittsburgh's expansion? Explain.

2. What year is this? _____

Part Nine

Look at the river. Examine the area that is now called the point. Look in the foreground, toward what is now called the Hill District.

Name three ways the environment is being polluted.

What recent changes have you noticed that Pittsburgh has made to fix this problem?

What year is this? _____

Leaf through pages 373-455. Pay careful attention to the pictures.

What changes has Pittsburgh made during this so-called 'Rebirth'?

Name _____ Date _____ Period ____

You will be given a score between 5 to 1 for each of the goals listed below, for a total of 60 points possible on this project. A score of 5 means that you have exceeded the objective, 4 the objective has been met, 3 the objective was vaguely met, 2 the objective was barely met, 1 the objective was not met.

Material List and Action Plan (A list of materials used and an action plan to carry out the clean up/restoration of your outdoor area.)

- A. List is complete and well written. 5 4 3 2 1
- B. Action plan is attainable, thorough and well thought out. 5 4 3 2 1
- C. Action plan and material list turned in on time. 5 4 3 2 1

Tree and Animal Survey Laboratory Report.

- Laboratory report turned in on time. 5 4 3 2 1
- Scientific Method format included. 5 4 3 2 1
- Observations and Data tables included. 5 4 3 2 1
- Calculations (Show your work and use units). 5 4 3 2 1
- Conclusion Questions(4- Sentence form, 5-paragraph form)5 4 3 2 1

Outdoor Space Pamphlet.

- Clear description of your outdoor space. 5 4 3 2 1
- Clear list of your responsibilities in your outdoor space. 5 4 3 2 1
- Photographs of your outdoor space. 5 4 3 2 1

Use of good grammar and sentence structure.

Name _____ Date _____ Period _____

The Richest Man In The World: Andrew Carnegie

REFLECTION QUESTIONS

1. How did the following people affect Andrew Carnegie ideology?

A. His mother:

B. His father

C. His grandfather and Uncle:

2. After moving to Pittsburgh, explain the changes that occurred in Andrew Carnegie's life.

3. How does Darwin's survival theory of evolution and survival of the fittest, play a key role in Andrew Carnegie's business practices and principles.

4. What were the working and living conditions like for the steel mill workers in Pittsburgh, Homestead, and Braddock? Explain.

5. The famous Homestead Steel Strike, was the sight of a very important event in Industrial history. How did management and the workers harm the environment?

6. What role did the environment play in the Industrial Revolution? Explain.

7. Do you think that Carnegie was a hypocrite or a great, benevolent, businessman? Explain.

8. What was Andrew Carnegie's role in World Peace? Explain.

9. What was the one environmentally good act that Andrew Carnegie performed after he sold his steel mills and how much money did he give away? Explain.

Name _____ Date _____ Period _____

Writing Exhibit: A Persuasive Essay

This entry shows your ability to write a persuasive essay to Andrew Carnegie- Steel Industry Mogul and Philanthropist. Mr. Carnegie gave millions of dollars to finance the Carnegie Library System. If you were in charge of an environmental organization, how would you persuade Mr. Carnegie to finance your operation instead of or in conjunction to a free library? Propose an environmental organization activity that would:

Be free to all people and provide a benefit to ALL people.

Provide a service to the community.

Make a positive impact on future generations.

Take care of itself financially in the long run or require very little in the way of taxpayer dollars.

This entry should also show your ability to write a persuasive essay. People who read this essay will look for evidence that you can:

Engage the reader by establishing a context, creating a point of view or persona, and using other appropriate techniques to develop reader interest.

Include a controlling idea that organizes your writing and makes a clear and logical judgement.

Organize your writing in a way that is appropriate to the needs and interests of a specified audience. (Mr. Carnegie)

Use a range of strategies to elaborate and persuade such as:

definitions

descriptions

illustrations

examples

anecdotes

Arrange details, reasons, examples, and/or anecdotes effectively and persuasively.

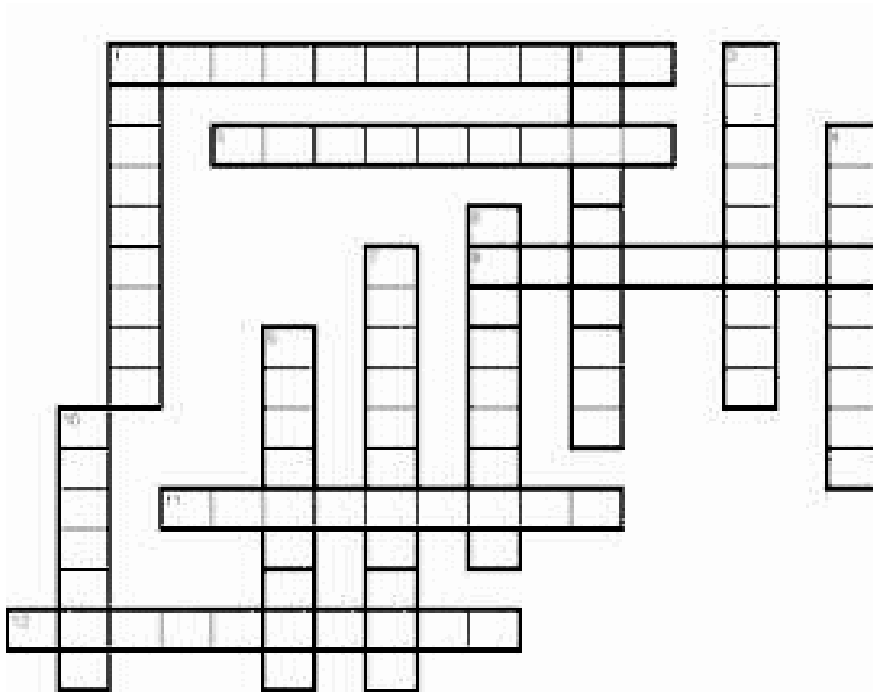
Include appropriate information and arguments; exclude those that are irrelevant.

Anticipate and address reader concerns and counter-arguments

Support arguments with detailed evidence, citing sources of information.

(This entry slip is provided by New Standards[™] High School English Language Arts Portfolio)

Name _____ Section 3.2 How Organisms Interact



Across

1. depends on autotrophs for food
5. feeds on other animals
8. eats both plants and animals
11. both species benefit
12. breakdown dead/decaying organisms

Down

1. Organism that feeds on plants
2. harms but does not kill host
3. living together
4. feed on refuse/dead organisms
6. model to show flow of energy/matter
7. one species benefits other not harmed nor benefits
9. uses solar/chemical energy for food
10. all possible feeding relationships

Name _____ Date _____ Period ____

Ecology Videos

1. Natural communities are organized according to the _____ of the many different organisms.

Each organism in a community occupies a niche according to the role it plays, which ecologists call a _____.

The primary source of energy on earth is the _____.

What is the primary food producer? _____

Herbivores are specially adapted for feeding on _____.

Primary carnivores serve as a food source for _____

TRUE OR FALSE: Bears can be herbivores and carnivores.

TRUE OR FALSE: Almost every living thing is subject to parasites.

TRUE OR FALSE: Decomposers fulfill a niche in the community.

Each niche contains a larger number of individuals than the _____ that eats it.

TRUE OR FALSE: Matter is cycled in the environment.

Most Biotic communities are _____ complex.

Soil: A natural habitat

A lot of _____ inhabit the soil.

A very good arable soil will contain _____% humus, _____% mineral substances, _____% water and _____% air.

Weathering disintegrates the surface of _____.

Each clay particle is composed of stratum. Each stratum is made up of _____.

TRUE OR FALSE: Dead leaves are not important to the soil

It is primarily _____ and _____ that turn leaf litter into humus.

Earthworms feed on bacteria in the _____.

A-horizon is where the _____ turns leaf litter to humus.

TRUE OR FALSE: It is a great idea to use a lot of fertilizer.

It is important for healthy soil to retain nutrients and _____.

TRUE OR FALSE: When a compost heap is open, organisms have turned old grass and leaves into humic substance.

Name _____ Date _____ Period _____

A Glimpse of the Past

Goal: To learn more about the sources of energy and the energy-related technology used by people during the first part of the 20th century.

Procedure:

1. Identify someone who was living in the early 1900's. Ask them to share their experiences about what life was like when they were young. If you cannot interview an elderly person, ask one of your parents, a neighbor, or a friend to tell you what they know about their parents or grandparent's lifestyle.
2. During the interview ask questions about the sources of energy and the energy-related technology which they used. Some suggested questions follow. Ask other questions, which you think are important. Do not hurry the interview; allow the person plenty of time to respond to each question.
3. After the interview, write an article about the life of the person you interviewed and share it with the class. The article should flow like your questions, only in paragraph form, and with your details and descriptions.

[If it is absolutely not possible to interview someone create a fictional character who was living in 1888, research possible answers you might receive for the questions below. Then proceed to step 3.]

Name of Person _____ Age _____

Suggested questions:

1. What source of energy was used to heat your home when you were young?

a. Was this same source of energy used when you were older?

b. If not, what source was used and when was the change made?

c. Were your bedrooms heated?

d. What type of covers were on your bed?

3. How did the clothing you wore then differ from the clothing in your closet today?

a. How was the water heated for washing?

b. What materials were used to make clothing ?

c. Did clothing require ironing? If so what type of iron was used?

4. Did you grow most of your own food or buy it at the store?

a. How often did you go to the store?

b. How did you keep milk and other food from spoiling?

c. How did foods available then differ from foods available today?

d. What type of stove was used to cook food?

e. How often did you eat dinner away from home?

f. Do you eat out more often today?

5. What means of transportation was used to get to the store?

a. To school? _____

b. Did you take a vacation? _____

c. If so, how many miles did you travel?

d. What means of transportation did you use?

6. What forms of entertainment were available?

a. What energy sources were used?

b. To what extent did your entertainment depend upon gasoline or petroleum products?

7. Did you work harder when you were young than young people do today?

a. Do you think young people have an easier life today?

b. Has the availability of more energy made your life better?

c. In what ways was life better then than it is now?

(This Activity can be found in Environmental Science, Investigations: How the World Works and Your Place In It, by Jane L. Person, 1989. Pages 113 and 114)

Appendix B- Content Standards

The Pittsburgh Public Schools has adopted, in accordance with the State of Pennsylvania Department of Education, Content Standards for each subject taught with in the district. The following standards are related to the Ecology Unit. A sincere attempt has been made to incorporate all the content standards that are met in this unit, along with a brief description of the standard.

Science and Technology Standards

1. All students explain how scientific principles of chemical, physical, and biological phenomena have developed and relate them to real world situations.

2. All students demonstrate knowledge of basic concepts and principles of physical, chemical, biological and earth sciences.
3. All students use and master materials, tools and processes of major technologies, which are applied in economic and civic life.
5. All students construct and evaluate scientific and technological systems using models to explain or predict results.
6. All students develop and apply skills of observation, data collection, analysis, pattern recognition, prediction, and scientific reasoning in designing and conducting experiments and solving technological problems.
8. All students evaluate the impact on current and future life of the development and use of varied energy forms, natural and synthetic materials, and production and processing of food and other agricultural products.
9. All students demonstrate basic computer literacy, including word processing, software applications, and the ability to access the global infrastructure, using current technology.

The following section lists the Content Standards for an Environmental Science or Ecology Curriculum.

Environment and Ecology

1. All students understand and describe the components of ecological systems and their function.
2. All students analyze the effects of social systems, behaviors and technologies on ecological systems and environmental quality.
3. All students think critically and generate potential solutions to environmental issues.
4. All students evaluate the implications of finite natural resources and the need for conservation, sustainable agricultural development, and stewardship of the environment.
5. All students demonstrate an understanding of the local, national, and International implications of environmental and ecological issues.