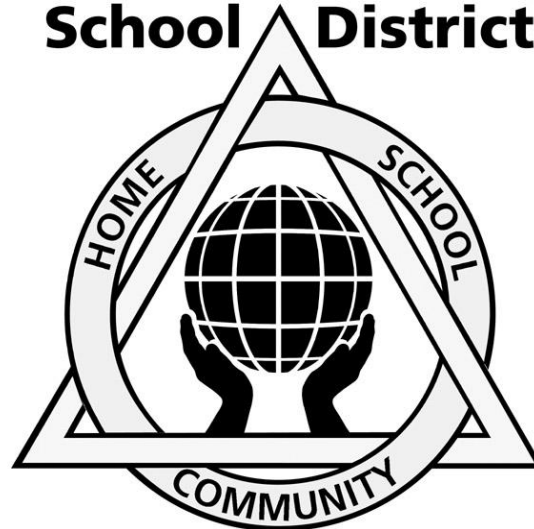


# **Environmental Studies Science Curriculum Francis Howell School District**

**Francis Howell  
School District**



**LEARNING TOGETHER**

**Board Approved: April 19, 2012**

## **Francis Howell School District Mission Statement**

Francis Howell School District is a learning community where all students reach their full potential.

### **Vision Statement**

Francis Howell School District is an educational leader that builds excellence through a collaborative culture that values students, parents, employees, and the community as partners in learning.

### **Values**

Francis Howell School District is committed to:

- Providing a consistent and comprehensive education that fosters high levels of academic achievement for all
- Operating safe and well-maintained schools
- Promoting parent, community, student, and business involvement in support of the school district
- Ensuring fiscal responsibility
- Developing character and leadership

### **Francis Howell School District Graduate Goals**

Upon completion of their academic study in the Francis Howell School District, students will be able to:

1. Gather, analyze and apply information and ideas.
2. Communicate effectively within and beyond the classroom.
3. Recognize and solve problems.
4. Make decisions and act as responsible members of society.

### **Science Graduate Goals**

The students in the Francis Howell School District will graduate with the knowledge, skills, and attitudes essential to leading a productive, meaningful life.

Graduates will:

- Understand and apply principles of scientific investigation.
- Utilize the key concepts and principles of life, earth, and physical science to solve problems.
- Recognize that science is an ongoing human endeavor that helps us understand our world.

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- Realize that science, mathematics, and technology are interdependent, each with strengths and limitations that impact the environment and society.
- Use scientific knowledge and scientific ways of thinking for individual and social purposes.

### **Course Rationale**

Science education develops science literacy. Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. A sound grounding in science strengthens many of the skills that people use every day, like solving problems creatively, thinking critically, working cooperatively in teams, using technology effectively, and valuing life-long learning. Scientific literacy has become a necessity for everyone.

To accomplish this literacy, science courses will reflect the following:

- Develop scientific reasoning and critical thinking skills.
- Extend problem-solving skills using scientific methods.
- Include lab-based experiences.
- Strengthen positive attitudes about science.
- Incorporate the use of new technologies.
- Provide relevant connections to personal and societal issues and events.

**Course Description**

**Environmental Studies** – Course #131270

**Credit:** 1 unit

**Prerequisite:** Completion of Biology

The student will explore various fundamental and advanced ecological concepts. Topics include: ecosystems, water quality, air quality, solid waste, populations, natural resources, and recycling. Environmental responsibility will be emphasized through class discussions, lab situations/simulations, and fieldwork.

**Coding:**

The Learner Objectives and the concepts are coded to the National Science Education Standards (NSES) and the Student To Do statements are coded to both NSES and the Concepts within the strand.

**Example:** (C1a; A)

“C1a” aligns to the National Science Education Standards

“A” aligns to the concept on the strand

**Francis Howell School District  
Biology Honors Curriculum Writers**

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**Francis Howell School District  
Environmental Studies Curriculum Map**

**First Semester: (First and Second Quarter)**

<p><b><u>Foundations of Environmental Studies</u></b></p> <ul style="list-style-type: none"> <li>● <u>Science Skills</u></li> <li>● <u>Biased Environmental Practices</u></li> <li>● <u>Sustainability</u></li> <li>● <u>Basis for Environmental Decisions</u></li> </ul> <p style="text-align: center;"><b><u>3 weeks</u></b></p>	<p><b><u>Water Quality</u></b></p> <ul style="list-style-type: none"> <li>● <u>Hydrologic Cycle</u></li> <li>● <u>Waste Water</u></li> <li>● <u>Water Pollution</u></li> <li>● <u>Water Conservation</u></li> <li>● <u>Water Availability</u></li> </ul> <p style="text-align: center;"><b><u>5 weeks</u></b></p>	<p><b><u>Solid Waste Management</u></b></p> <ul style="list-style-type: none"> <li>● Types of Solid Waste</li> <li>● Pollution Problems</li> <li>● Global Challenges</li> <li>● Human Induced Waste</li> </ul> <p style="text-align: center;"><b><u>4 weeks</u></b></p>	<p><b><u>Air Quality</u></b></p> <ul style="list-style-type: none"> <li>● Climate Change</li> <li>● Indoor and Outdoor quality</li> <li>● Burning of Fossil Fuels</li> <li>● Acid Deposition</li> </ul> <p style="text-align: center;"><b><u>4 weeks</u></b></p>
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**Second Semester: (Third and Fourth Quarter)**

<p><b><u>Human Population</u></b></p> <ul style="list-style-type: none"> <li>● <u>Growth Patterns</u></li> <li>● <u>Demographics</u></li> <li>● <u>Equity Among Countries</u></li> <li>● <u>High Population Issues</u></li> <li>● <u>Cultural Differences</u></li> </ul> <p style="text-align: center;"><b><u>4 weeks</u></b></p>	<p><b><u>Energy</u></b></p> <ul style="list-style-type: none"> <li>● Energy conservation</li> <li>● Renewable and nonrenewable</li> <li>● Energy Sustainability</li> <li>● Energy Policies</li> </ul> <p style="text-align: center;"><b><u>4 weeks</u></b></p>	<p><b><u>Ecosystems</u></b></p> <ul style="list-style-type: none"> <li>● Connections in Nature</li> <li>● Energy Flow</li> <li>● Cycling of Matter</li> <li>● Roles Within An Ecosystem</li> <li>● Biological Communities</li> <li>● Value of Ecosystems</li> </ul> <p style="text-align: center;"><b><u>4 weeks</u></b></p>	<p><b><u>Biodiversity</u></b></p> <ul style="list-style-type: none"> <li>● Loss of Biodiversity</li> <li>● Public Lands</li> <li>● Value of Biodiversity</li> <li>● Conservation and Sustainability</li> </ul> <p style="text-align: center;"><b><u>5 weeks</u></b></p>
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<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Foundations of Environmental Studies</b>
<b>Learner Objectives: The foundation of environmental science is the study of how living things interact with each other and with their nonliving environment. (A)</b>		

**Concepts:**

- A. The application of science skills is essential to the interpretation and understanding of the interactions within the biosphere. (A1)
- B. The distribution of resources, money, and pollution can lead to unfair decisions and/or biased environmental practices. (F1)
- C. Earth’s resources must be available for future generations. (F3)
- D. Environmental decisions are often based on economics and politics instead of what is environmentally sound. (F4)

Students Should Know...	Students Should Be Able to...
<ul style="list-style-type: none"> <li>● There is no fixed procedure called “the scientific method”, but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations. IN1Af</li> <li>● Some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies. IN1Ae</li> <li>● Observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results.) IN1Bf</li> <li>● The independent variable is manipulated by the experimenter. The dependent variable is the measured variable of the outcome. Constant variables are conditions that remain constant throughout the experiment so as not to affect the outcome.</li> </ul>	<ul style="list-style-type: none"> <li>● Formulate testable questions and hypotheses. (IN1Aa)</li> <li>● Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment. (IN1Ab)</li> <li>● Design and conduct a valid experiment. (IN1Ac, A1b)</li> <li>● Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders.) (IN1Ba)</li> <li>● Use quantitative and qualitative data as support for reasonable explanations (conclusions.) (IN1Ca)</li> <li>● Analyze experimental data to determine patterns, relationships, perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable.) (IN1Cb)</li> <li>● Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models.) (IN1Cd)</li> </ul>

<ul style="list-style-type: none"> <li>● A control in an experiment is the standard by which the dependent variable can be compared.</li> <li>● The title of a graph is the relationship between the independent and dependant variables.</li> <li>● The I.V. is on the X axis and the D.V. is on the Y axis.</li> <li>● Quantitative data is numerical data. Qualitative data is descriptive data.</li> <li>● Correct lab procedures are followed to ensure safety.</li> <li>● Water is polar because of the two hydrogen and one oxygen form a bent molecule.</li> <li>● Water is the universal solvent.</li> <li>● The atmosphere is made of nitrogen, oxygen and carbon dioxide.</li> <li>● All living things need macronutrients such as iron, calcium and sulfur.</li> <li>● pH is the measure of hydronium ions.</li> <li>● Gross National Product (GNP) is the most frequent used indicator of economic growth.</li> <li>● Index of Sustainable Economic Welfare accounts for the negative effects of environmental degradation.</li> <li>● Several alternatives to GNP exist and place more value on the environment.</li> <li>● Radical environmentalism involves people taking direct actions for the environment and often polarizes politics.</li> <li>● Political agendas often counter environmental measures like the endangered species act to promote economic growth.</li> <li>● Sustainability describes how biological systems remain <u>diverse</u> and productive over time, a necessary precondition for human well-being.</li> <li>● Healthy ecosystems and environments provide vital goods and services to humans and other organisms.</li> </ul>	<ul style="list-style-type: none"> <li>● Communicate the procedures and results of investigations and explanations through:             <ul style="list-style-type: none"> <li>➤ Oral presentations</li> <li>➤ Drawings and maps</li> <li>➤ Data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities)</li> <li>➤ Graphs (bar, single, and multiple line)</li> <li>➤ Equations and writings (IN1Da)</li> </ul> </li> <li>● Communicate and defend a scientific argument. (IN1Db)</li> <li>● Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work.) (IN1Dc)</li> <li>● Evaluate the role of basic chemical principles in the environment (pH, conservation of mass/matter, water polarity, structure of the atom, chemical bonding, chemical equations, etc.) (B3a; A)</li> <li>● Compare and contrast various economic indices as they relate to environmental issues. (F4c; D)</li> <li>● Distinguish between political agendas and sound environmental and scientific judgment. (F4c; D)</li> <li>● Evaluate the importance of sustainability. (F3c; C)</li> </ul>
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**Instructional Support**

Francis Howell School District Curriculum Department

Student Essential Vocabulary					
Gross National Product	Hydronium ions	Sustainability	Stewardship	Sound science	Scientific method
Independent variable	Dependant variable	Economics	Politics		



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Readiness & Equity Section			
SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA--Thinking creatively	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #1: (See Appendix A )</b>  <b>Conservation of Mass Lab</b>                      In this lab students will design a scientific experiment demonstrating the Law of Conservation of Mass. They will use common household items, like baking soda and vinegar, plastic bottles and balloons as well as scientific equipment such as a balance to model the law. Students are given limited directions and must design their own method to verify the law. The lab will accomplish two things: investigating the Law of Conservation of Mass as well as constructing and conducting a valid experiment. A scoring guide and student page for the lab are also attached.</p>		<p><b>Assessment # 1: (See Appendix AA)</b>  <b>Experimental Design Assessment</b>                      In the assessment of experimental design students are given a new question/situation in which they must design an experiment to test the effect of road salt on roadside flowers.</p>	
Activity's Alignment		Assessment's Alignment	
<b>GLE/CLE/STD</b>	IN1Ac, A1b	<b>GLE/CLE/STD</b>	IN1Ac, A1b
<b>CONTENT</b>	SC7	<b>CONTENT</b>	SC7
<b>PROCESS</b>	3.3-Apply one's own strategies 3.5-Reason logically	<b>PROCESS</b>	3.3-Apply one's own strategies 3.5-Reason logically
<b>DOK</b>	3-Strategic thinking	<b>DOK</b>	3-Strategic thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic representations	<b>LEVEL OF EXPECTATION</b>	80% Mastery level

Francis Howell School District Curriculum Department

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	SLA-Global Awareness	Non Fiction Reading & Writing	<b>SLA &amp; SA</b>
Learning & Innovation Skills	SLA-Critical Thinking and Problem Solving	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills	SLA-Social and Cross-Cultural Skills	Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<b>Learning Activity #2: (See Appendix B)</b> <b>Environmental Inquiry-SciJourn</b> Students will do an in depth inquiry into any environmental idea of their choosing within the themes for environmental studies, water quality, air quality, energy, biodiversity, human population, solid waste or ecology. To accomplish this they will read and discuss science news as well as work to search for relevant and credible information from multiple sources that is factually accurate. This is a multi day process.		<b>Assessment #2: (See Appendix BB)</b> <b>News Article-SciJourn Scoring Guide</b> The students will write a news article about some current event that has occurred that will cause them to apply their background research. They will use their multiple credible sources, to write the article. See the appendix for a sample student news article and more information about the program established by an NSF grant and administered through the University of Missouri-St. Louis or go to <a href="http://WWW.SciJourner.org">WWW.SciJourner.org</a> for samples of student work. Scoring guides are found in the appendix.	
<b>Activity's Alignment</b>		<b>Assessment's Alignment</b>	
<b>GLE/CLE/STD</b>	A1f, A2a, A2b, CA3	<b>GLE/CLE/STD</b>	A1f, A2a, A2b, CA3, CA4
<b>CONTENT</b>	SC7, CA3	<b>CONTENT</b>	SC7, CA3, CA4
<b>PROCESS</b>	1.2 – Conduct research 1.7 – Evaluate information 2.4 – Present perceptions and ideas 2.7 – Use information technology	<b>PROCESS</b>	1.7 – Evaluate information 2.4 – Present perceptions and ideas 2.7 – Use information technology
<b>DOK</b>	3 – Strategic Thinking	<b>DOK</b>	3 – Strategic Thinking

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<b>INSTRUCTIONAL STRATEGIES</b>	Summarizing and note taking Cooperative learning	<b>LEVEL OF EXPECTATION</b>	80 % Mastery level
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<b>Resources</b>			
<b>Student</b>		<b>Teacher</b>	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● <b><u>WWW.SciJourney.org</u></b></li> <li>● <i>Front Page Science: Engaging Teens in Science Literacy</i>, Saul, Kohnen, Newman, and Pearce. NSTA press</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● <b><u>WWW.SciJourney.org</u></b></li> <li>● <i>Front Page Science: Engaging Teens in Science Literacy</i>, Saul, Kohnen, Newman, and Pearce. NSTA press</li> </ul>
<b>ENRICHMENT:</b>		<b>ENRICHMENT:</b>	
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Water Quality</b>
<b>Learner Objectives: Water keeps us alive, removes and dilutes wastes and pollutants, and is recycled by the hydrologic cycle. (F)</b>		

**Concepts:**

- A. Water must be of a quality to support life. (F4)
- B. Water is cleaned through natural processes. (F4)
- C. Waste water is generated by every human action and must be purified. (F4)
- D. Availability of water varies and can cause social and economic conflict. (F3)
- E. Water conservation practices must be implemented to ensure quality water resources for all living things. (F4)
- F. The causes of and prevention strategies for water pollution must be understood to maintain high quality water for all living organisms. (F4)

<b>Students Should Know...</b>	<b>Students Should Be Able to...</b>
<ul style="list-style-type: none"> <li>● Water moves through the biosphere and it is called the hydrologic cycle.</li> <li>● Basic properties of water include adhesion, cohesion, high specific heat, universal solvent.</li> <li>● Karst features are a result of basic water properties.</li> <li>● Water is responsible for the leaching of chemicals.</li> <li>● Water is cleaned by movement through soil and vegetation.</li> <li>● Waste water treatment is a necessary biological process.</li> <li>● Water pollution components include solid waste, chemical waste each presenting unique environmental issues.</li> <li>● The ability of water to clean itself varies depending on its location.</li> <li>● Water quality can be determined chemically or biologically.</li> <li>● Water availability is not evenly distributed throughout North America.</li> <li>● Drinking water can come from groundwater or surface water.</li> </ul>	<ul style="list-style-type: none"> <li>● Describe how water dissolves substances and leeches into the environment. (F4a; A)</li> <li>● Evaluate where abundances and shortages of water resources occur in the US which can lead to conflict. (F3a; D)</li> <li>● Determine location of drinking water. (F3a; D)</li> <li>● Describe eutrophication and its causes. (F4a; A)</li> <li>● Describe how water moves through the biosphere. (F4a; B)</li> <li>● Describe water movement through groundwater, aquifers, soil and rock. (F4a; B)</li> <li>● Compare natural purification and purification done by humans. (F4a; E)</li> <li>● Differentiate between the different types of water pollution and the environmental issues they present. (F4b; C)</li> <li>● Analyze water quality of a fresh water ecosystem. (F4c; F)</li> <li>● Describe the importance of wetlands, estuaries and mangroves. (F4a; B)</li> </ul>

**Instructional Support**

<b>Student Essential Vocabulary</b>					
Aquifer	Karst	Estuary	Waste water	Floodplain	Ground Water
Hydrologic Cycle	Hydrosphere	Non-point Source Pollution	Point Source Pollution	Percolation	Riparian Zone
Runoff	Watershed	Water Table	Wetland	Zone of Saturation	Mangrove
Eutrophication	Leachate				

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Readiness & Equity Section			
SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	Environmental Literacy, SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Critical Thinking and Problem Solving, SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #1: (See Appendix C and CC)</b>  <b>Biological Survey of a Stream:</b>                      Students will use various benthic macroinvertebrates to determine the water quality rating of a stream. They will conduct a biological survey of a stream using the procedures set forth by the Missouri Stream Team. Students will then identify and count the various benthic macroinvertebrates they have collected at the stream site and organize that data on a Biological Survey Data Sheet. A water quality rating will be determined based on the different species of benthic macroinvertebrates collected at the site. Lastly, the students will reflect on the survey and create an improvement plan for the quality of the water.</p>		<p><b>Assessment #1: (See Appendix D and DD ppt )</b>  <b>Benthic Macroinvertebrate Assessment:</b>                      The students will be given five different preserved benthic macroinvertebrate specimens to identify. The students will have to correctly identify each individual specimen based on its characteristics and identify each specimen's tolerance to pollution.</p> <p>The students will also be given a scenario to analyze the water quality based on information given.</p>	
Activity's Alignment		Assessment's Alignment	
<b>GLE/CLE/STD</b>	F4c; F	<b>GLE/CLE/STD</b>	F4c; F
<b>CONTENT</b>	SC8	<b>CONTENT</b>	SC8
<b>PROCESS</b>	1.6 – Discover/evaluate relationships 1.10 - Apply information, ideas and skills	<b>PROCESS</b>	1.6 – Discover/evaluate relationships 1.10 – Apply information, ideas and skills
<b>DOK</b>	3 – Strategic Thinking	<b>DOK</b>	3 – Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Cooperative Learning Nonlinguistic Representations	<b>LEVEL OF EXPECTATION</b>	Mastery Level 80%

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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	Environmental Literacy, SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Critical Thinking and Problem Solving, SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills	Flexibility and Adaptability, SLA	Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>			

<p><b>Learning Activity #2:</b>  <b>The Sum of All Parts:</b>                  In this activity, students are told they inherited 100 acres of riverfront property and \$1,000,000.</p> <ol style="list-style-type: none"> <li>1. Students are given a 12"x18" piece of paper (each sheet of paper has a number written on the back of it) where they are instructed to draw a representation of how they would use the money to develop the land they inherited.</li> <li>2. After the students have completed their illustration of their property, they are asked to identify the number written on the back of the sheet of paper they received. In numerical order, the students will then present to the class how they developed their property and how they used the water.</li> <li>3. Students in the class will identify potential sources of water pollution and explain how they are affecting the water quality in each presentation.</li> <li>4. Each student's paper is then attached to the next student's paper in numerical order, representing adjacent properties bordering the same river. The total number of pollution sources is added up as the water flows downstream through the properties the students developed.</li> <li>5. After all of the sources of pollution have been identified, students are asked to make changes to their property that would eliminate most if not all of the sources of water pollution the property once contained.</li> <li>6. Students will then present their property a second time to the class and explain how the changes they made reduced or</li> </ol>	<p><b>Assessment #2:</b>  <b>Water Purification Exit Card:</b></p> <ol style="list-style-type: none"> <li>1. Compare and contrast natural water purification processes to the water purification processes used by humans.</li> <li>2. Which process do you believe is more beneficial? Provide three explanations that justify your answer.</li> </ol> <p><i>Rubric:</i></p> <p><i>Question 1: 3 points – student compares and contrasts at least 3 characteristics of each process in detail.</i></p> <p><i>2 points – student compares and contrasts at 2 or 3 characteristics in some detail, but not complete detail</i></p> <p><i>1 point - student compares and contrasts a single characteristic in some detail</i></p> <p><i>0 point – student does not compare and contrast any details, or does so incorrectly</i></p> <p><i>Question 2: 3 points – student identifies which method they believe is most beneficial and provides at least 3 reasons justifying their answer.</i></p> <p><i>2 points – student identifies which method they believe is most beneficial and provides 2 reasons justifying</i></p>
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<p>eliminated the sources of water pollution. They should also identify any natural processes that will help purify any pollution sources and explain how they will reduce the pollutants.</p> <p>Students will be assessed on their ability to identify potential sources of pollution (animal waste, sediment runoff, runoff from impervious surfaces, pesticides, fertilizers, cleaning products, etc), and their ability to take the appropriate actions to reduce these sources of pollution.</p>		<p><i>their answer.</i></p> <p><i>1 point – student identifies which method they believe is most beneficial and provides 1 reason justifying their answer.</i></p> <p><i>0 points – student identifies which method they believe is most beneficial but does not justify their answer.</i></p>	
Activity’s Alignment		Assessment’s Alignment	
<b>GLE/CLE/STD</b>	F4b, F4a; C, E	<b>GLE/CLE/STD</b>	F4a; E
<b>CONTENT</b>	SC8	<b>CONTENT</b>	SC5, SC8
<b>PROCESS</b>	1.10-Apply information, ideas and skills 2.1-Plan and make presentations 3.1-identify and define problems	<b>PROCESS</b>	1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills
<b>DOK</b>	2 – Skill/Concept	<b>DOK</b>	3 – Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Non-linguistic Representation	<b>LEVEL OF EXPECTATION</b>	Mastery Level 85%

Resources	
Student	Teacher

Francis Howell School District Curriculum Department

<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● Environmental Science Teacher’s Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>
<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>● <a href="http://www.mostreamteam.org">www.mostreamteam.org</a></li> <li>● Eyewitness: Ponds and Rivers</li> <li>● Planet Earth: Fresh Water</li> <li>● Reciprocal Teaching Activity – Students read one of two articles and then write, predict and teach others. Great Marzano activity! See Appendix V &amp; W</li> </ul>	<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>● <a href="http://www.mostreamteam.org">www.mostreamteam.org</a></li> <li>● Eyewitness: Ponds and Rivers</li> <li>● Project WET booklet</li> <li>● Planet Earth: Fresh Water</li> </ul>
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Solid Waste Management</b>
<b>Learner Objectives: Humans produce an increasing amount of solid waste which must be managed. (F)</b>		

**Concepts:**

- A. Solid waste is a human induced problem that is dealt with in many ways. (F4)
- B. Solid waste is not generated equally among all people of the world which creates global challenges. (F3, F6)
- C. Some solid waste is hazardous and causes pollution problems. (F5)

<b>Students Should Know...</b>	<b>Students Should Be Able to...</b>
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<ul style="list-style-type: none"> <li>● The largest component of waste in a landfill is paper.</li> <li>● Plastics are derived from petroleum.</li> <li>● The recycling triangles on plastics indicate what type of plastic is contained in the product and if it can be recycled.</li> <li>● Humans can reduce the waste going to landfills by reducing, reusing, and recycling.</li> <li>● The causes of increased solid waste include population growth, disposable packaging and excessive packaging.</li> <li>● The majority of the trash in the U.S. today is disposed of in sanitary landfills.</li> <li>● Solid waste is anything humans dispose of as being no longer useful.</li> <li>● The Environmental Protection Agency is responsible for the monitoring of landfills construction and monitoring for groundwater contamination.</li> <li>● Energy can be recovered from solid waste if it is combusted or from biogas capture from landfills.</li> <li>● Hazardous waste is anything that is toxic, corrosive, ignitable or reactive and it is tracked cradle to grave by The Resource Conservation and Recovery Act.</li> </ul>	<ul style="list-style-type: none"> <li>● Describe how solid waste has been dealt with historically. (F5b;A)</li> <li>● Explain how a landfill works. (F5d;A)</li> <li>● Summarize the negative effects of plastics on the environment. (F5d;C)</li> <li>● Compare and contrast the amount of waste generated by developed and developing countries. (F5a;B)</li> <li>● Describe what a super fund site is and how it is funded. (F5d;C)</li> <li>● Describe techniques to decrease solid waste, such as recycling, reusing, and reducing and what the impacts of these are. (F5d;A)</li> <li>● Determine what the components of a landfill are and determine the impact if major components were eliminated. (F4a;A)</li> <li>● Explain and give examples of how chemicals can move through living organisms causing biomagnification which can cause unknown consequences years later. (F5c;C)</li> <li>● Give examples of how countries with weak environmental laws can be taken advantage of by countries with stronger laws. (F6b;B)</li> <li>● Explain and give an example why the disposal of hazardous waste is a controversial issue. (F6a;C)</li> </ul>
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**Instructional Support**

Student Essential Vocabulary					
Solid waste	Biodegradable	Resource recovery	Biomimicry	Toxic	Ignitable
Municipal solid waste		EPA – Environmental Protection Agency	Pre-consumer waste	Reactive	Biomagnification
Biogas	Waste to energy		Post-consumer waste	Corrosive	Nimby
Superfund site					

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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	SLA- Environmental Literacy; SA- Environmental Lit.	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA- Judgments and Decisions SA – Solve Problems	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills	SA – Be Flexible	Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	

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<b>Learning Activity #1: (See Appendix E)</b> <b>Out of Site, Out of Mind</b> Students will do calculations based on the amount of solid waste generated each day in the United States to visualize how much waste is generated in their family as well as in our city and state. If each person could generate just one less pound of solid waste each day it would have a large impact on our streams and our landfills.		<b>Assessment #1: (See Appendix EE)</b> <b>Exit Slip on Solid Waste Reduction</b> After discussing solid waste and doing the activity students should have come to realize we throw away a huge amount of solid waste that goes primarily to a landfill. Many students believe they cannot make a difference. The challenge in this assessment is to see if they can come up with behaviors that they personally can do to reduce the waste they throw away everyday by just one pound. If everyone threw away one less pound there would be a large impact on our landfills and our environment. <b>Scoring Guide:</b> There are several specific behaviors listed, the main point is to reduce, reuse, recycle or refuse. Students need to come up with specific examples of these that they personally can do every day.	
<b>Activity's Alignment</b>		<b>Assessment's Alignment</b>	
<b>GLE/CLE/STD</b>	F4a	<b>GLE/CLE/STD</b>	F4a
<b>CONTENT</b>	SC8	<b>CONTENT</b>	SC8, EC4
<b>PROCESS</b>	1.6 Discover/evaluate relationships 1.10 Apply information, ideas and skills	<b>PROCESS</b>	1.10 - Apply information, ideas and skills 3.1- Apply one's own strategies 4.5- Develop/revise plans of action
<b>DOK</b>	2 – Skill/concept	<b>DOK</b>	2- Skill/Concept
<b>INSTRUCTIONAL STRATEGIES</b>	Similarities and Differences	<b>LEVEL OF EXPECTATION</b>	Mastery Level – 80 %

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	SLA – Environmental Literacy; Health Literacy SA –Environmental Literacy; Health Literacy	Non Fiction Reading & Writing	SLA – Internet Research
Learning & Innovation Skills	SLA – Communication & Collaboration	Enrichment Opportunity	

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Information, Media, & Technology Skills	SLA – Information Literacy	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<p><b>Learning Activity #2: (See Appendix F and FF)</b>  <b>Hazardous Household Products Brochure Project-</b>                  Students will use the Internet to research hazardous household products and the safer alternatives to these products. This is a comparison of products that will perform the same function. Students will use the information to make a bi-fold or tri-fold brochure that will be printed like a professional informational brochure.</p>		<p><b>Assessment #2: (See Appendix G)</b>  <b>Which Hazard Is It?</b>                  Students will apply what they have learned about what makes a product or waste product hazardous to four scenarios.  <b>Terms: corrosive, ignitable, toxic, and reactive.</b>  <b>Scoring Guide:</b>                  Each of the four scenarios is worth 1 point.</p>	
<b>Activity’s Alignment</b>		<b>Assessment’s Alignment</b>	
<b>GLE/CLE/STD</b>	F5d	<b>GLE/CLE/STD</b>	F5d
<b>CONTENT</b>	SC8, CA4, H/PE6	<b>CONTENT</b>	SC8,
<b>PROCESS</b>	1.7 Discover/evaluate relationships 1.10 Apply information, ideas and skills	<b>PROCESS</b>	1.10 Apply information, ideas and skills 3.1 Apply one’s own strategies 4.5 Develop / revise plans of action
<b>DOK</b>	3 - Strategic Thinking	<b>DOK</b>	2- Skills / Concept
<b>INSTRUCTIONAL STRATEGIES</b>	Similarities and Differences	<b>LEVEL OF EXPECTATION</b>	Mastery Level – 80%

<b>Resources</b>			
<b>Student</b>		<b>Teacher</b>	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>Environmental Science Teacher’s Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>

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	<ul style="list-style-type: none"> <li>● Poster project on solid waste</li> <li>● Trash lab</li> <li>● Movie: Synthetic Seas</li> <li>● Movie: Talking Trash</li> <li>● Article on Weldon Spring Superfund site</li> <li>● Article on Times Beach superfund site</li> </ul>		
<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>● Article: Trahsbusters</li> <li>● Calculation of Recycling at FHC</li> </ul>	<b>ENRICHMENT:</b>	
<b>INTERVENTION</b> :		<b>INTERVENTION</b> :	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Air Quality</b>
<b>Learner Objectives: Air quality can change as a result of human processes. (F)</b>		

**Concepts:**

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- A. Burning of fossil fuels and deforestation has contributed to climate change which impacts life on Earth. (F4)
- B. Indoor and outdoor air pollution can be detrimental to living organisms. (F5)
- C. Excess combustion products in the atmosphere lead to acid deposition. (F4)

Students Should Know...	Students Should Be Able to...
<ul style="list-style-type: none"> <li>● The atmosphere is composed of the troposphere, stratosphere, mesosphere, and thermosphere.</li> <li>● Essential ozone is found in the stratosphere while ozone detrimental to life on earth is found in the troposphere which humans are primarily responsible for.</li> <li>● Naturally occurring air pollutants exist including volcanoes, fires, dust storms, conifer trees but these are rarely harmful as they are assimilated and recycled by the biosphere.</li> <li>● The biggest contribution to air pollution is from the burning of fossil fuels.</li> <li>● Primary pollutants are emitted directly into the atmosphere.</li> <li>● Secondary pollutants result when primary pollutants undergo reactions in the atmosphere.</li> <li>● An air quality index has been developed as a warning for people.</li> <li>● Adverse effects of air pollution are categorized as chronic, acute and carcinogenic.</li> <li>● The composition of the soil or rock can buffer bodies of water from acid deposition.</li> <li>● Air pollution can occur both indoors and outdoors.</li> <li>● The Clean Air Acts of 1970, 1977 and 1990 set standards on suspended particulates, sulfur dioxide, carbon monoxide, nitrogen oxides, lead and ozone.</li> <li>● Glacial periods last approximately 100,000 years while interglacial periods last approximately 10,000 years which shows that earth's climate cycles.</li> <li>● It is generally accepted by scientists that the earth's climate is getting warmer.</li> </ul>	<ul style="list-style-type: none"> <li>● Describe how the increased use of fossil fuel has caused problems in the atmosphere (F4a; A)</li> <li>● Explain what has caused the thinning of the ozone at the poles and what has been done globally to decrease this. (F4a; A)</li> <li>● Determine the cause and affects of acid deposition. (F5c; C)</li> <li>● Describe the sources of indoor air pollution. (F5b; B)</li> <li>● Explain what affects air pollution can have on humans. (F5d; B)</li> <li>● Explain measures that have been taken regionally to decrease air pollution. (F4a; A)</li> <li>● Identify the major greenhouse gasses and explain ways these gas emissions may be reduced. (F4b; A)</li> <li>● Compare and contrast the controversy surrounding global climate change. (F6a; A)</li> <li>● Explain why we should be concerned about global climate change. (F3b; A)</li> </ul>



<ul style="list-style-type: none"> <li>• A large portion of the carbon dioxide on earth is stored or sequestered in the ocean.</li> </ul>	
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**Instructional Support**

<b>Student Essential Vocabulary</b>					
Primary pollutants	Photochemical smog	Acute	Acid	Interglacial period	CFC's chlorofluorocarbons
Secondary pollutants	Industrial smog	Carcinogenic	Base	Stratosphere	Climate
Buffers	Chronic	pH	Glacial period	Troposphere	

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	SLA – Health Literacy, Environmental Literacy, SA – Health Literacy, Environmental Literacy	Non Fiction Reading & Writing	

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Learning & Innovation Skills	SLA – Use Systems Thinking, Make Judgments and Decisions, SA – Make Judgments and Decisions, Communicate Clearly	Enrichment Opportunity	Air Pollution: What’s the Solution? – Sources of Particulate Matter
Information, Media, & Technology Skills	SLA – Information Literacy, Apply Technology Effectively, SA – Use and Manage Information	Intervention Opportunity	
Life & Career Skills	SLA – Productivity and Accountability – Produce Results, SA – Be Responsible to Others	Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<p><b>Learning Activity #1: (See Appendix H)</b>  <b>Air Pollution: What’s the Solution?</b>                  Students will use the interactive smog visualization application, Smog City at <a href="http://www.smogcity.com/">www.smogcity.com/</a> . They will see what the relationship is between ozone levels and variables such as population levels and emissions and their affect on air quality. They will design an experiment using the variables available on the Smog City application and determine the outcome of their experiment by running the program.</p>		<p><b>Assessment #1: (See Appendix I)</b>  <b>Air Quality Warning</b>                  Students are given a scenario that they are weather person and must give a forecast on the air quality for the next day based on the weather conditions they are given. They must tell what the air quality will be for the next day and write a warning that they would give people on the news including who is at risk and why.</p>	
<b>Activity’s Alignment</b>		<b>Assessment’s Alignment</b>	
<b>GLE/CLE/STD</b>	F5d	<b>GLE/CLE/STD</b>	F5d
<b>CONTENT</b>	SC4, SC5, SC7, SC8	<b>CONTENT</b>	SC3, SC4, SC8

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<b>PROCESS</b>	1.6 Discover / evaluate relationships 1.1 Develop research questions / ideas 1.2 Conduct research 1.3 Design / conduct investigations 1.10 Apply information, ideas and skills 2.7 Use information technology 3.8 Assess consequences 4.7 Apply safety / health practices	<b>PROCESS</b>	1.10 Apply information, ideas and skills 2.6 Apply communication techniques 3.8 Assess consequences 4.7 Apply safety/health practices
<b>DOK</b>	3 – Strategic Thinking	<b>DOK</b>	3 – Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic representations Generating and testing hypotheses	<b>LEVEL OF EXPECTATION</b>	Mastery Level: 75%

**Readiness & Equity Section**

**SLA = Sample Learning Activity & SA = Sample Assessment**

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21 <sup>st</sup> Century Themes	SLA – Global Awareness, Health Literacy, Environmental Literacy, SA – Global Awareness, Environmental Literacy	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA – Use Systems Thinking, Make Judgments and Decisions, SA – Make judgments and Decisions	Enrichment Opportunity	
Information, Media, & Technology Skills	SLA – Information Literacy, Apply Technology Effectively	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<p><b>Learning Activity #2: (See Appendix J)</b>  <b>Global Warming Web Quest –</b>                  Students will use the Internet to take a virtual museum tour of the “Global Warming Facts &amp; Our Future” exhibit at the Koshland Science Museum of the National Academy of Science. They will go through the exhibit and answer questions concerning the carbon cycle, greenhouse gases as well as why the climate cycles between glacial and interglacial periods. The questions lead students through methods that scientists have used to determine that climate change has taken place in the past and what the models predict for the future.</p>		<p><b>Assessment #2: (See Appendix JJ)</b>  <b>Global Warming / Climate Change Exit Slip</b>                  Students will answer two questions on what humans have done to contribute to the global warming / climate change problem and how do scientists know that our climate has changed.</p> <p><b>Scoring guide:</b> Burning of fossil fuels has caused the largest human impact on our climate. Students are asked to list one thing they can do to decrease their impact on global warming. Historical climate data can be collected from ice cores, leaves, seeds, and wood and tree cores.</p>	
<b>Activity’s Alignment</b>		<b>Assessment’s Alignment</b>	
<b>GLE/CLE/STD</b>	F4a	<b>GLE/CLE/STD</b>	F4a
<b>CONTENT</b>	SC4, SC5, SC8, SC1	<b>CONTENT</b>	SC3, SC4, SC5, SC8

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<b>PROCESS</b>	1.6 - Discover/ evaluate relationships 1.10 - Apply information, ideas and skills 2.7 - Use information technology 3.1 - Identify and define problems 3.8 - Assess consequences	<b>PROCESS</b>	1.10 - Apply information, idea and skills 3.1 - Identify and define problems 3.3 - Apply one's own strategies
<b>DOK</b>	2 – Skill / Concept	<b>DOK</b>	2 – Skill / Concept
<b>INSTRUCTIONAL STRATEGIES</b>	Summarizing and note taking Similarities and differences	<b>LEVEL OF EXPECTATION</b>	Mastery Level: 80%

<b>Resources</b>			
<b>Student</b>		<b>Teacher</b>	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> <li><a href="http://www.smogcity.com">www.smogcity.com</a></li> <li><a href="http://www.koshlandscience.org/exhibitgcc/index.jsp">www.koshlandscience.org/exhibitgcc/index.jsp</a></li> </ul>	<b>GENERAL:</b>	Environmental Science Teacher's Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006
<b>ENRICHMENT:</b>		<b>ENRICHMENT:</b>	
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Human Population</b>
<b>Learner Objectives: Human population growth affects the sustainability of the planet. (F)</b>		

**Concepts:**

- A.** Populations grow in predictable patterns. (F2)
- B.** Human population growth in developed and developing countries is not equal and the demographics predict what will happen to the population in the future . (F2)
- C.** Resource use, production of waste and pollution, availability of human services and distribution of wealth are not equal among countries. (F2)
- D.** Countries with high population growth struggle with famine and disease. (F2)
- E.** Cultural differences make it difficult to address the population growth issue. (F2)

<b>Students Should Know...</b>	<b>Students Should Be Able to...</b>
<ul style="list-style-type: none"> <li>● Population change = (births + immigration) – (deaths + emigration).</li> <li>● Human population continues to grow exponentially.</li> <li>● Commonly examined demographics include gender, <u>race</u>, age, disabilities, mobility, home ownership, employment status, and even location.</li> <li>● Developed countries have a lower population growth rate than developing countries.</li> <li>● China is the most populated country in the world with India as second.</li> <li>● Factors affecting the birth rate, replacement fertility rate and death rate will directly influence the population growth of a country.</li> <li>● Age structure diagrams determine what will happen to a population in the future.</li> </ul>	<ul style="list-style-type: none"> <li>● Interpret graphs of human population from historical times to present day and discuss why human population has increased. (F2c; A)</li> <li>● Predict from demographic diagrams whether a population will decrease, increase or remain stable in the future. (F2b; B)</li> <li>● Compare the resource use, wealth, production of waste and pollution, disease and human services between a developed and a developing country. (F2a; C)</li> <li>● Describe what happens when a population grows unchecked. (F2c; D)</li> <li>● Explain why the ecological footprint of a developed country is larger than that of a developing country. (F2c; C)</li> </ul>

<ul style="list-style-type: none"> <li>• China has a government enforced program to decrease population growth which has been more successful than the voluntary program used in India.</li> <li>• Consumption of resources and waste production by individuals or countries determine their ecological footprint.</li> </ul>	
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**Instructional Support**

<b>Student Essential Vocabulary</b>					
CBR – crude birth rate	Developing country	Replacement fertility rate	Replacement fertility rate	Age structure diagrams	Ecological footprint
CBD – crude death rate	Developed country	Carrying capacity			

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Readiness & Equity Section			
SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	SLA – Environmental Literacy	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA – Critical Thinking and Problem Solving	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #1: (See Appendix K)</b>  <b>Human Population Growth</b>                      Students will graph human population from 1650 to 2011. They will extrapolate using their graph to make predictions about the human population in the future. They will use the data, graph and knowledge to predict when humans will hit the carrying capacity on earth and what will happen then.</p>		<p><b>Assessment #1: (See Appendix KK)</b>  <b>Interpreting Population Graphs</b>                      Students will be given a population graph to interpret.</p> <p><b>Key:</b> Students will name the type of population graph that is shown and give the two names for this type of graph. They will have to determine the carrying capacity for the human population and determine when exponential growth was taking place.</p>	
Activity’s Alignment		Assessment’s Alignment	
<b>GLE/CLE/STD</b>	F2c	<b>GLE/CLE/STD</b>	F2c
<b>CONTENT</b>	SC3, M6, M1	<b>CONTENT</b>	SC3, SC4, M6
<b>PROCESS</b>	1.10- Apply information, ideas and skills 3.5- Reason logically 1.9- Compare past and present societies 3.8- Assess consequences	<b>PROCESS</b>	1.6- Discover/evaluate relationships 1.10- Apply information, ideas and skills



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<b>DOK</b>	3 – Strategic Thinking	<b>DOK</b>	2 – Skill/ Concept
<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic representations	<b>LEVEL OF EXPECTATION</b>	Mastery Level: 80%

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	SLA – Global Awareness, Health Literacy, Environmental Literacy	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA – Make Judgments and Decisions	Enrichment Opportunity	
Information, Media, & Technology Skills	SLA – Information Literacy	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<b>Learning Activity #2: (See Appendix L and LL)</b> <b>2011 World Population Data Sheet w/ Population Reference Bureau Information 2011</b> Students will use World Population Data to research questions comparing different countries in the world on specific population topics. They will determine from current data what countries have the largest population currently and that this will not remain the same in the future. The data compares crude birth and death rates, infant mortality rates, total fertility rates, purchasing powers as well as others.		<b>Assessment #2: (See Appendix M)</b> <b>Human Population Quiz</b> Students will use age structure graphs to answer questions about human population growth. <b>Key:</b> Age structure graphs indicate what will happen to the population of the country in the future. In an age structure graph the most important indicator of what will happen to the population is the number of people under age 15. The shape of an age structure graphs tells much about the population of a country and allows us to make assumptions about the challenges that country will be facing.	
<b>Activity's Alignment</b>		<b>Assessment's Alignment</b>	
<b>GLE/CLE/STD</b>	F2a	<b>GLE/CLE/STD</b>	F2c
<b>CONTENT</b>	SC3, SC8	<b>CONTENT</b>	SC3, SC4, SC8, M1
<b>PROCESS</b>	1.10 Apply information, ideas and skills 1.7 Evaluate information	<b>PROCESS</b>	1.6 Discover/evaluate relationships 1.10 Apply information, ideas and skills

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<b>DOK</b>	2 – Skill / Concept	<b>DOK</b>	2 - Skill / Concept
<b>INSTRUCTIONAL STRATEGIES</b>	Similarities and differences	<b>LEVEL OF EXPECTATION</b>	Mastery Level: 75%

<b>Resources</b>			
<b>Student</b>		<b>Teacher</b>	
<b>GENERAL:</b>	Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006	<b>GENERAL:</b>	Environmental Science Teacher’s Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006
<b>ENRICHMENT:</b>		<b>ENRICHMENT:</b>	
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			



<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Energy</b>
<b>Learner Objectives: Energy availability has a direct impact on social, economic, political, and environmental systems. (F)</b>		

**Concepts:**

- A. Energy conservation is an important step toward meeting the world’s energy needs. (F3)
- B. Clean, renewable energy technologies are necessary for meeting the world’s sustainable energy needs. (F3)
- C. There are advantages and disadvantages to both renewable and non-renewable sources of energy. (F3)
- D. Political, social, and economic forces shape current energy policies. (F6)

<b>Students Should Know...</b>	<b>Students Should Be Able to...</b>
<ul style="list-style-type: none"> <li>● The first law of thermodynamics states that energy cannot be created or destroyed.</li> <li>● The second law of thermodynamics states that energy is lost during the transfer of energy.</li> <li>● Fossil fuels which contain a high level of carbon are fuels that take millions of years to form and include coal, oil and natural gas.</li> <li>● There is a limited supply of nonrenewable resources on Earth which includes coal, oil, and natural gas.</li> <li>● Renewable resources can be regenerated, such as wind, hydro and geothermal energy.</li> <li>● It is important to shift to clean forms of energy for sustainability.</li> <li>● Strip mining, subsurface mining and drilling are common practices used to extract fossil fuels.</li> <li>● Developed countries consume energy at a greater rate than developing countries.</li> </ul>	<ul style="list-style-type: none"> <li>● Discuss the pros and cons of using renewable and non-renewable energy. (F3b; C)</li> <li>● Identify where our energy comes from in the United States. (F3a; A)</li> <li>● Describe the different methods for obtaining fossil fuels and their impact on the environment. (F3a; C)</li> <li>● Differentiate between the various renewable energy sources. (F3b; B)</li> <li>● Identify who the major energy consumers of the world are and why there is competition for non-renewable resources. (F3a; A)</li> <li>● Evaluate government priorities on energy policies as related to political, social, and/or economic forces. (F6d; D)</li> <li>● Evaluate products for higher energy efficiency and reduced costs. (Compact fluorescent light bulbs, hybrid cars, etc.) (F6d; D)</li> </ul>

<ul style="list-style-type: none"> <li>• There are subsidies and tax breaks for individuals and corporations using energy conservation measures; ex. Geothermal heat pumps.</li> <li>• Economics plays a part in every energy decision made.</li> </ul>	
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**Instructional Support**

<b>Student Essential Vocabulary</b>					
Biofuel	Carbon Cycle	Coal	Crude Oil	EPA	Fossil Fuels
Geothermal Energy	Greenhouse Effect	Greenhouse Gasses	Hydrocarbon	Hydropower	Natural Gas
Net Energy	Nondegradeable Pollution	Nonrenewable Resource	Nuclear Energy	Petrochemicals	Photochemical Smog
Renewable Resources	Reserves	Second Law of Thermodynamics	Solar Energy	Subsurface Mining Strip Mining	Sulfur Cycle
Synfuels	Synthetic Natural Gas	Wind Farm	Wind Turbines	Solar Panels	First Law of Thermodynamics

**Readiness & Equity Section**

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SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	Environmental Literacy; SLA, SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Critical Thinking and Problem Solving; SLA, SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #1: (See Appendix N)</b>  <b>Which Bulb Costs More:</b>                      Students will be asked to research the two types of light bulbs (incandescent and compact fluorescent light bulb), and explain the differences between the two types of bulbs in detail (including how they are produced, how the bulb works, etc)</p> <p>Students will then calculate the cost differences between an incandescent and compact fluorescent light bulb. They will determine which one if more cost efficient.</p>		<p><b>Assessment #1:</b>  <b>Home Improvement:</b>                      Identify 5 things that you feel is negatively affecting the energy efficiency of your home. Develop a plan to reduce the amount of energy your household is “wasting” and explain how these improvements will help increase your homes energy efficiency.</p> <p><i>Scoring Guide:</i></p> <p><i>10 points for identifying 5 things and addressing each in in a plan with an explanation of how the changes will improve their homes energy efficiency</i></p> <p><i>8 points for identifying 4 things and addressing each in in a plan with an explanation of how the changes will improve their homes energy efficiency</i></p> <p><i>6 points for identifying 3 things and addressing each in in a plan with an explanation of how the changes will improve their homes energy efficiency</i></p> <p><i>4 points for identifying 2 things and addressing each in in a plan with an explanation of how the changes will improve their homes energy efficiency</i></p>	

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		<i>2 points for identifying 1 thing and addressing it in a plan with an explanation of how the changes will improve their homes energy efficiency</i>	
Activity's Alignment		Assessment's Alignment	
<b>GLE/CLE/STD</b>	F6d; D	<b>GLE/CLE/STD</b>	F6d; D
<b>CONTENT</b>	SC8, MA1	<b>CONTENT</b>	SC8
<b>PROCESS</b>	1.6 – Discover/Evaluate relationships	<b>PROCESS</b>	1.10 – Apply information, ideas
<b>DOK</b>	2-Skill/Concept	<b>DOK</b>	3-Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Similarities and differences	<b>LEVEL OF EXPECTATION</b>	80% Mastery Level

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Readiness & Equity Section			
SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	Environmental Literacy; SLA, SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Creativity and Innovation Skills; SLA	Enrichment Opportunity	
Information, Media, & Technology Skills	Apply Technology Effectively; SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #2: (See Appendix O)</b>  <b>Energy Research Project:</b>                      Students use two days in the computer lab to research a chosen energy source (hydro, wind, solar, coal, etc). The students will work in groups to construct a presentation either on poster board or in the form of a PowerPoint and present their information to the class. Some of the information included in the presentation is: the percentage of usage by the world/US of that energy source, the pros and cons of using that energy source, the availability of the energy source, etc. During the presentation, the class will take notes on an energy chart.</p>		<p><b>Assessment #2:</b>                      Identify the most practical form of renewable energy that can be used in our area. Justify your reasoning for why this would be a practical alternative energy source and why some of the other forms would not be considered practical for our area.</p> <p><i>Scoring Guide:</i></p> <p><i>5 points for identifying a renewable energy source that is practical in our area and providing reasonable justification, as well as discussing why some other forms are not practical for our area</i></p> <p><i>3 points for identifying a renewable energy source that is practical in our area and providing reasonable justification, but NOT discussing why some other forms are not practical for our area</i></p> <p><i>1 point for identifying a renewable energy source that is practical in our area.</i></p>	



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Activity's Alignment		Assessment's Alignment	
<b>GLE/CLE/STD</b>	F3b; C	<b>GLE/CLE/STD</b>	F3b; B
<b>CONTENT</b>	SC8, CA6	<b>CONTENT</b>	SC8
<b>PROCESS</b>	1.10 – Apply information, ideas 2.1 – Plan and make presentations	<b>PROCESS</b>	1.10 – Apply information, ideas 3.1 – Identify and define problems
<b>DOK</b>	2-Skill/Concept	<b>DOK</b>	3-Strategic thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic Representation Summarizing and Note Taking	<b>LEVEL OF EXPECTATION</b>	75% Mastery Level

Resources			
Student		Teacher	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>Environmental Science Teacher's Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>
<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>United Streaming Alternative Energy Video</li> </ul>	<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>United Streaming Alternative Energy Video</li> </ul>
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Ecosystems</b>
<b>Learner Objectives: The earth’s natural balance is sustained by the interactions of biotic and abiotic factors. (C)</b>		

**Concepts:**

- A. Ecology is the study of connections in nature. (C4)
- B. Energy flows through the ecosystem and matter cycles. (C5)
- C. A variety of ecosystems exist on the planet and all are of significant value to the health of the planet. (C4)
- D. There are discrete roles within ecosystems that must be maintained (C4)
- E. Biological communities differ in their physical structure, species diversity, and the ecological roles their species play. (C4)

Students Should Know...	Students Should Be Able to...
<ul style="list-style-type: none"> <li>● A food web is a model of the trophic connections between organisms.</li> <li>● Food chains demonstrate direct feeding relationships between organisms</li> <li>● Ecological pyramids represent energy flowing through an ecosystem</li> <li>● The process of converting the energy of the sun into usable energy is photosynthesis.</li> <li>● The nitrogen cycle makes useable forms of nitrogen available to plants and animals.</li> <li>● The water cycle is how water is moved through the biosphere.</li> <li>● The carbon cycle shows how carbon moves through living and non-living portions of the biosphere.</li> <li>● The <b>phosphorus cycle</b> describes the movement of <u>phosphorus</u> through the <u>lithosphere</u>, <u>hydrosphere</u>, and <u>biosphere</u>.</li> <li>● The availability of food, water and shelter are the basic needs that all organisms require for survival.</li> </ul>	<ul style="list-style-type: none"> <li>● Discuss how energy flows and matter (biogeochemical) cycles through the biosphere. (C5f; B)</li> <li>● Identify limiting factors in the environment (C5e; E)</li> <li>● Identify the roles (niches) and organisms that fill those roles in specific ecosystems. (i.e. herbivore, keystone) (C4c; D)</li> <li>● Describe the negative effects that human activities can have on an ecosystem. (C4e, F5b; A)</li> <li>● Evaluate environmental factors as biotic or abiotic (C4a; A)</li> <li>● Compare and contrast various biomes considering biotic and abiotic factors (i.e., geology, climate, flora, fauna, and water composition.) (C4c; C)</li> <li>● Explain symbiotic relationships (ie., commensalism, mutualism, and parasitism.) (C4c, 4d; A)</li> <li>● Compare and contrast primary and secondary succession. (F5c;C)</li> <li>● Graph and interpret population changes over time. (A1e; A)</li> <li>● Predict trends in populations due to various factors such as disease, lack of food, space, introduction of predators, etc.(C4d; A)</li> </ul>

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<ul style="list-style-type: none"> <li>● The earth is divided into several biomes like the tundra, tropical rainforest and desert.</li> <li>● All living things are either producers or consumers.</li> <li>● Producers make their own energy from an outside source</li> <li>● Consumers must rely on other organisms for their energy</li> <li>● Immigration and birth increase populations</li> <li>● Emigration and death decrease populations</li> <li>● Exponential growth occurs with unlimited resources</li> <li>● Carrying capacity is the total number of individuals an area can support</li> </ul>	
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**Instructional Support**

<b>Student Essential Vocabulary</b>					
Population	Ecosystem	Nutrient cycle	Biome	Biotic	Abiotic
Limiting factor	Biomass	Gross primary productivity	Net primary productivity	Soil horizon	Ecological niche
Fundamental niche	Realized niche	Generalist species	Specialist species	Species diversity	Indicator species
Keystone species	Parasitism	Mutualism	Commensalisms	Ecological succession	Primary succession
Secondary succession	Climax community	Carrying capacity	Biotic potential	Environmental resistance	Logistic growth
Exponential growth	r-selected species	K-selected species	Resource partitioning	Nitrogen fixation	Denitrification
Ammonia	Nitrite	Nitrate	Trophic level	Lithosphere	Hydrosphere
Biosphere					

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Readiness & Equity Section			
SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	SLA-Environmental Literacy	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA-Critical Thinking and Problem Solving	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<b>Learning Activity #1: (See Appendix P)</b> <b>Deer Population Lab</b> Students will develop a scientific model for a complex situation by simulating a deer population in an open space. After multiple generations of deer population growth starting with one deer, the population will reach carrying capacity. Even with the introduction of a predator the population will stabilize and a relationship between the predator and prey will develop. Upon completion of the data gathering phase, they will graph their data and analyze how the population growth pattern found in nature.		<b>Assessment #1: (See Appendix Q)</b> <b>Population Assessment</b> Students will apply the concept of a logistic growth curve in a new context by selecting one of four possible growth curves projected on the SMART board that best describe a natural population growth curve. The students will then differentiate and compare the phases of the growth curve.	
Activity's Alignment		Assessment's Alignment	
NESE	C4d	NESE	C4d
CONTENT	SC3, SC4	CONTENT	SC3, SC4
PROCESS	1.6 Discover/evaluate relationships	PROCESS	1.6 Discover/evaluate relationships
DOK	3 - Strategic thinking	DOK	3 - Strategic thinking

FHSD Academics dmtEnvironmental Studies BOE approval

April 19, 2012

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<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic representations	<b>LEVEL OF EXPECTATION</b>	85% - Mastery Level
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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	Environmental Literacy	Non Fiction Reading & Writing	
Learning & Innovation Skills	Critical Thinking	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<b>Learning Activity #2: (See Appendix R)</b> <b>What Makes Up the Ecosystem?</b> Students will support the ideas learned about populations, communities and ecosystems with details and examples in the real world. They will attempt to find representative organisms in the environment and hypothesize their roll in the population, community and ecosystem while recording and sharing the information they find about the world around us.		<b>Assessment #2: (See Appendix S)</b> <b>What Makes an Ecosystem Assessment</b> Students will have to support their ideas with details and examples when they transfer what they have learned about organisms, populations, communities and ecosystems to a new situation. They are given a situation where the environment has been altered by the introduction of a new species and musts hypothesize how the ecosystem will adjust.	
<b>Activity's Alignment</b>		<b>Assessment's Alignment</b>	
<b>NESE</b>	C4c	<b>GLE/CLE/STD</b>	C4c
<b>CONTENT</b>	SC4	<b>CONTENT</b>	SC4
<b>PROCESS</b>	1.6 Discover/evaluate relationships	<b>PROCESS</b>	1.10 Apply information , ideas, & skills 1.6 – Discover/evaluate relationships
<b>DOK</b>	3 -Strategic Thinking	<b>DOK</b>	3 -Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Similarities and differences	<b>LEVEL OF EXPECTATION</b>	85% - Mastery Level

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Resources			
Student		Teacher	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>• Environmental Science by Miller</li> <li>• Nature Unbound MDC</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>• Environmental Science by Miller, TE</li> <li>• Nature Unbound MDC, TE</li> <li>• Great Pacific Media DVD <i>Basics of Ecology, community interactions</i></li> </ul>
<b>ENRICHMENT:</b>		<b>ENRICHMENT:</b>	
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

<b>Content Area: Science</b>	<b>Course: Environmental Studies</b>	<b>Strand: Biodiversity</b>
<b>Learner Objectives: Biodiversity is important for sustainability of the earth. (C)</b>		

**Concepts:**

- A. Human actions are primarily responsible for the loss of biodiversity. (C4)
- B. Conservation of public lands and resources is one way to ensure sustainability. (C4)
- C. An awareness of the natural world will lead citizens to better understand the value of biodiversity. (C4)

<b>Students Should Know...</b>	<b>Students Should Be Able to...</b>
<ul style="list-style-type: none"> <li>● U.S. Fish and Wildlife Service is responsible for endangered species and the recovery plans for these species.</li> <li>● It is important to have areas set aside that will not be negatively impacted by development and other negative human interactions</li> <li>● Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or an entire planet.</li> <li>● Human activities can negatively affect the biodiversity of Earth</li> <li>● Without human intervention some species will become extinct</li> <li>● The Missouri Department of Conservation is the primary organization that manages our natural resources in Missouri.</li> <li>● Management techniques can be useful for maintaining healthy populations of organism in the wild</li> <li>● If wild populations are not kept in check, disease, starvation and habitat destruction may occur.</li> <li>● Many organisms are dependent either directly or indirectly on other members of the ecosystem</li> </ul>	<ul style="list-style-type: none"> <li>● Discuss why the recovery programs of endangered species can be controversial. (C4e; A)</li> <li>● Identify public lands and what they have to offer. (C4e; B)</li> <li>● Explain the implications that can occur with decreased biodiversity. (C4c; A)</li> <li>● Identify causes that can lead to the endangerment of species. (C4e; A)</li> <li>● Identify possible consequences for not managing certain wildlife populations. (C4d; B)</li> <li>● Describe the importance of biodiversity within an ecosystem. (C4c; C)</li> </ul>

**Instructional Support**

<b>Student Essential Vocabulary</b>					
Commercial Extinction	Conservation	Ecological Restoration	Game Species	Sustainable Yield	Population Dispersion
Over harvest	Home Range	Acre	Introduced Species	Invasive Species	Endangered Species
Threatened Species	Rare Species	Biodiversity	Extirpate		

**Readiness & Equity Section**



SLA = Sample Learning Activity & SA = Sample Assessment			
21 <sup>st</sup> Century Themes	Environmental Literacy, SLA/SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Creativity and Innovation, SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills	Flexibility and Adaptability, SLA	Gender, Ethnic, & Disability Equity	
Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #1: (See Appendix T)</b>  <b>Living with Whitetails:</b></p> <ol style="list-style-type: none"> <li>1. Students watch a short video documentary about urban whitetail issues. (2 part DVD, the 1<sup>st</sup> is “Living with White-tailed Deer” and the 2<sup>nd</sup> part is “Real Communities, Real Solutions;” videos can be provided by the Quality Deer Management Association (QDMA.)</li> <li>2. The students are divided into six interest groups (Animal Welfare Association, Citizens for Biodiversity, Wildlife Biologist, Park Officials, Homeowners Association, and Conservation Association). Two individual students are given the job of being the town mayor and town council president. The students will assume the role and views of their specific interest group, and research various methods for controlling and/or reducing our over abundance of whitetail deer.</li> <li>3. Possible solutions for the problem include birth control, sharp shooters, fencing, local hunters, trap and transfer. Our “town” can spend \$100,000 from the environmental budget to reduce the deer herd.</li> <li>4. Students spend two days in the computer lab researching the various methods their interest group agrees with and finding</li> </ol>		<p><b>Assessment #1:</b>  <b>National Forest:</b>  Throughout the United States, millions of acres have been set aside for the harvesting of timber products. In Missouri, these public forests are our Mark Twain National Forest. The US Forest Service is responsible for managing these lands for forest products. Many individuals feel that the government has no need to be harvesting timber from our national forest, however everyone uses forest products and the demand for forest products would far outweigh the supply if we were not allowed to harvest timber from the national forest.</p> <ol style="list-style-type: none"> <li>1. Construct a forest management plan for a 10,000 acre section of the national forest. The plan must include methods that would allow for the sustainability of the forest. It must also allow for adequate timber harvest, but also keep in mind that individuals enjoy recreational time in the forest. One should use various timber harvesting methods in the management plan (selective harvesting, patch-work clear cutting, TSI, etc)</li> <li>2. Scoring Guide:  3 points – Students include multiple management practices in their plan (clear cutting, selective harvesting, etc). They should discuss in detail how they will utilize these</li> </ol>	

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<p>supporting evidence for those methods. They also spend time researching the methods their group opposes and collect evidence against those methods.</p> <p>5. The students then have a two day “town hall meeting” where we as a community, bring our ideas and research and discuss/debate how our whitetail deer population problem should be handled. The mayor and town council president run the town hall meeting.</p> <p>6. At the conclusion of the activity, the class develops a whitetail management plan to help keep the herd in check and prevent any future population issues.</p>		<p>practices to achieve timber harvest goals, and maintain a healthy forest ecosystem.</p> <p>2 points – Students use some management practices in their plan, and partially discuss the use of these practices. They vaguely discuss the plans relation to balancing timber harvest and maintaining a healthy forest ecosystem.</p> <p>1 point - Students identify some management practices, but fail to explain their management plan, and do not relate it to timber harvest goals or the health of the forest ecosystem.</p>	
Activity’s Alignment		Assessment’s Alignment	
<b>GLE/CLE/STD</b>	C4d; B	<b>GLE/CLE/STD</b>	C4e; B, C4d; B
<b>CONTENT</b>	CA6, SC3, SC 4, SC8	<b>CONTENT</b>	SC4
<b>PROCESS</b>	1.10-Apply information, ideas and skills 2.3-Exchange ideas/perspectives 3.6-Examine solutions 4.5-Develop plans of action	<b>PROCESS</b>	1.10-Apply information, ideas and Skills 3.5-Reason Logically
<b>DOK</b>	3 – Strategic Thinking	<b>DOK</b>	3 – Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Cooperative learning Summarizing and note taking	<b>LEVEL OF EXPECTATION</b>	75%

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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activity &amp; SA = Sample Assessment</b>			
21 <sup>st</sup> Century Themes	Environmental Literacy; SLA, SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	Critical Thinking; SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	
<b>Sample Learning Activities</b>		<b>Sample Assessments</b>	
<p><b>Learning Activity #2: (See Appendix U)</b>  <b>Amphibian Observation Activity:</b>                      Students are taken outside of school to observe several amphibian breeding ponds in late March to early April. The students are asked to make notes of their observations in a journal. They are asked to pay attention to the species observed and note characteristics such as size and color of the animal, note behavior, habitat, time of day and weather conditions the observations took place in. The students are then asked to research one of the species they observed and construct a natural history paper that describes the animal and explains some of the behaviors they observed during the outing. Students should also describe the organism’s role in the ecosystem.</p>		<p><b>Assessment #2:</b>  <b>Missing Pieces:</b>                      Together on the smart board, the students and the teacher will construct a detailed food web of a prairie ecosystem, showing the interactions between the various organisms that inhabit the prairie. Students will then answer the following:</p> <ol style="list-style-type: none"> <li>1. An environmental pollutant was released into the prairie ecosystem, causing 5 species to disappear. Predict how the removal of those species will affect the other species that still exist in the ecosystem. Justify your predictions, and explain why those organisms’ roles are important to the health of the ecosystem.</li> </ol> <p>Answer Key:                      3 points – The student discusses how the animals that consumed the missing organisms must now feed more heavily on the other available food sources, creating stress to those populations. The food availability will be reduced and decrease the carrying capacity of the consumers population. Overgrazing, or over consumption of other food sources could potentially lead to extirpation of the</p>	

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		<p>species. These changes can/will significantly alter the existing ecosystem.</p> <p>2 points - The student discusses how the animals that consumed the missing organisms must now feed more heavily on the other available food sources, including some relevant information, but missing other key points</p> <p>1 point – Students show some understanding in their answer with what would occur, however they are missing the “big picture” and leave out supportive details in their answer.</p>	
Activity’s Alignment		Assessment’s Alignment	
<b>GLE/CLE/STD</b>	C4c; C	<b>GLE/CLE/STD</b>	C4c; A, C
<b>CONTENT</b>	CA4, SC3, SC4	<b>CONTENT</b>	SC4, SC8
<b>PROCESS</b>	1.10 – Apply information 2.2 – Revise communications	<b>PROCESS</b>	1.6 – Discover/evaluate relationships 3.5 – Reason logically
<b>DOK</b>	2 – Skill/Concept	<b>DOK</b>	3 – Strategic Thinking
<b>INSTRUCTIONAL STRATEGIES</b>	Nonlinguistic representation	<b>LEVEL OF EXPECTATION</b>	85% - Mastery Level

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Resources			
Student		Teacher	
<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● Environmental Science / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> <li>● Video, Living with the White-tailed Deer</li> <li>● Video, Real Communities, Real Solutions</li> </ul>	<b>GENERAL:</b>	<ul style="list-style-type: none"> <li>● Environmental Science Teacher's Edition / Eleventh Edition/ G. Tyler Miller, Jr., Thomson, Brooks/Cole, copyright 2006</li> </ul>
<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>● www.qdma.com</li> <li>● mdc.mo.gov</li> <li>● mostateparks.com</li> <li>● Dream Season hunting video</li> </ul>	<b>ENRICHMENT:</b>	<ul style="list-style-type: none"> <li>● www.qdma.com</li> <li>● mdc.mo.gov</li> <li>● mostateparks.com</li> <li>● Dream Season hunting video</li> </ul>
<b>INTERVENTION:</b>		<b>INTERVENTION:</b>	
<b>NOTE:</b> These sections will be partially completed during the curriculum writing process and finalized during the year 1 review process.			

## Environmental Studies Appendix Documents

A	Conservation of Mass-Experimental Design
AA	Experimental Design Assessment
B	Human Footprint Activity
BB	Human Footprint Assessment
C	Biological Survey of a Stream—data collection information
CC	Biological Survey of a Stream—Reflection Questions
D	Benthic Macroinvertebrate Identification Assessment
DD	Macroinvertebrate ID ppt
E	Out of Site Out of Mind
EE	Exit Slip on Solid Waste Reduction
F	Household Hazardous Product Brochure Project
FF	Hazardous Waste Brochure sample
G	Which Hazard Is It
H	Air Pollution-What's the Solution
I	Air Quality Warning
J	Global Warming Web Quest
JJ	Global Warming – Climate Change Exit Slip
K	Human Population Growth
KK	Interpreting Population Graphs
L	World Population Data Sheet
LL	Population Reference Bureau 2011
M	Human Population Quiz
N	Which Light Bulb Costs
O	Energy Research Project
P	Deer Population Lab
Q	Population Assessment
R	What Makes Up an Ecosystem
S	What Makes Up an Ecosystem Assessment
T	Living with White-tailed Deer
U	Amphibian Observation Activity Scoring guide

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- V Enrichment Activity related to Water Quality (Reading non-fiction)
- W Enrichment Articles for Water Quality/non-fiction reading