Introduction to Ecological Concepts and the Environment

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Introduction:

Environmental science is an interdisciplinary study, although its central focus is based in the sciences many interdisciplinary skills are involved. This two week long unit is designed to actively engage fourth grade students in the material and allow them to fully grasp ecological concepts through observations, research and analytical skills.

The field of Environmental science, as with most sciences, emphasizes the importance of working within a group to solve problems and reach conclusions; therefore, throughout this unit the students are to work in groups. Terminology is essential in the realm of science; therefore, the students are presented with the terminology early on in the unit. The goal of administrating the terms is to break the language barrier between students and science.

The goal of this unit is not merely to familiarize the students with ecological terms and concepts but to engage the students in the material, ensure their understanding, and encourage the students to make connections with the material as they apply what they have learned. The unit strongly stresses the importance of teamwork, and the application of the material.

Objectives:

This unit will give the students a strong background in basic ecological and environmental concepts. The lessons and activities covered in this unit support many of the levels of learning outlined by Benjamin Bloom. Benjamin Bloom identifies six levels of learning that include: knowledge, understanding, application, analysis, synthesis and evaluation.  

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1 http://caribou.cc.trincoll.edu/depts_educ/Resources/Bloom.htm
This unit meets several of the goals set by the Connecticut State Framework for science. The Connecticut state framework states that the students should be able to do the following:

“Understand and apply basic concepts, principles and theories of biology, chemistry, physics, and earth science (including ecology)...”

“Use evidence and logical reasoning as a basis for decision making.”

“Describe the basic needs for organisms.”

“Discuss how organisms depend on other organisms and their environment for basic needs.”

“Describe how a variety of organisms (producers, consumers and decomposers) obtain their basic needs”

“Describe the role of producers, consumers and decomposers in an ecosystem and provide examples of each.”

In addition to promoting Blooms Taxonomy, and achieving the goals set forth by the state curriculum, this unit also emphasizes the importance of group work and the application of the material being covered, introducing a very hands-on approach to learning. Working in groups, the students are given the opportunity to share their ideas, help each other, and learn to express themselves within a group.

Students will work in lab groups applying the material learned. By applying the material they are introduced with, they are able to fully grasp the material, interpret the material and prove their knowledge and understanding of the material as they present their work to their peers.

Through this unit the students are to gain knowledge of the terms used in science that classify organisms according to their basic needs. The students are not simply to

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2 http://www.state.ct.us/sde/dtl/curriculum/currkey3.htm
memorize these terms but to understand and be able to apply the terms and make connections with the material throughout the unit. Throughout this unit the students are to gain essential research skills and be able to apply their research in a meaningful manner. The students are encouraged to engage in class discussions covering, incorporating and relating the material covered throughout the unit. By the end of the unit the students should be able to relate ecological concepts to their own everyday lives. This unit is designed to increase awareness of environmental issues, and the role the students can play in protecting the environment. The students must also realize that they can make a difference, and that their voice counts. At the end of the unit the students are to actively participate in the political aspect of environmental science. As citizens of the United States, they are to write to their congressman explaining their environmental concerns and what they would like to see changed.

Class One: An Introduction to Ecological Terminology

The first class will focus on introducing the students to some basic ecological terms used to classify organisms by their basic needs. The students will be presented with the terms, ‘herbivore, carnivore, omnivore, decomposer, producer, and consumer,’ and their definitions. The teacher will provide some examples of each.

Then the students will be separated into small lab groups of four or five. The students will gain the knowledge of the terminology used to classify organisms and will be expected to apply their understanding of the material, in order to ensure their accurate understanding of the terms. The students will be provided with various cards,
each card contains a picture of an organism on one side, and a brief description outlining what the organisms eats, where it lives and other habits pertaining to the organisms on the other side. Each student will choose a card. Using their understanding of the terms used to classify organisms according to their basic needs; the students are to decide under what category their organism falls into. Once they have decided on the terms used to classify their organism they are to stand behind their chair silently. Once everyone is standing, starting at one end of the room each student is to say the name of their organism, what classification the student choose and what factors brought the student to this conclusion. Once the student has presented their organism to the class they are to sit down quietly until every student has had the opportunity to present their conclusions in front of their peers.

Once the students are seated the teacher will introduce the concept of a food chain/food web. The teacher will provide several examples for the students to understand the concept. Then the students are to return to their groups and create a food web, using all the organisms each member of the group had chosen for the previous exercise. They are to discuss their ideas among themselves and decide where each organism belongs in the food web. After several minutes the teacher will pass out poster board. Each group will create a poster of their food web and present their posters in front of the class. During their presentation each group is not only to present their food web, but also explain why they decided in placing the animals in the way they did.

The students will be evaluated in their participation, and oral presentations. The main point of these activities is not for them to simply get the right answers, but rather,
for the students to formulate a scientific way of approaching problems. They need to explain their reasoning.

Class 2: Introduction to the Biomes: (Rainforest, Savanna, Desert, est….)

Students will be introduced to different biomes. The teacher will explain, in detail, some distinguishing characteristics of each biome. Once the students have an understanding of the descriptions of various biomes and the ability to differentiate between them, the class is to separate into their lab groups. Each group is to obtain one biome card. Each card will contain the picture of a biome on one side, and a description on the other. Using the description provided on the card, as a group the students are to determine what biome they have chosen.

Each table will be provided with a book on each possible biome, once the students have decided on which biome they have they are to conduct research by choosing the appropriate book. The students will also be provided a list of websites containing information about the biomes. One member per group will be allowed to use the computer, at a time. After a few minutes, the student that is at the computer must switch with another team member, in order to give each student an opportunity conduct on line research.

Once the students have conducted their research they are to apply their research into creating a poster project presenting their biome. Using the information and pictures they have found while during research, they are to create a creative and informative poster displaying their research. The entire group is responsible in presenting the poster in front of the class. In their presentation they are to explain what key features explained in the back of their card lead them to decide what biome they had chosen. Then they are
to discuss what kind of research they conducted, and finally they are to give a brief description of their biome.

The students will be evaluated on their participation, quality of research, understanding of the material and accuracy.

**Class 3: Creating a Mini-Biome**

The students are to return to their lab groups. The goal of this activity is for the students to once again apply their knowledge and work in groups. The students will create an example of the biome, chosen in the previous activity, in a shoebox using art supplies and any other applicable materials (twigs, leaves, clay, play dough, stickers, small toys etc.). The students will be told of this assignment in advance and letters will be sent home to their parents in case they have materials at home they would like to bring in to work on their mini-biomes. The teacher will supply a shoebox to each group, along with other basic materials. These mini-biomes along with their posters will be displayed around the classroom. Once all the biomes are completed each group is to stand in front of the class and present their biome, explaining what their biome looks like and how they tried to capture that in their creations.

The students will be evaluated in their participation, creativeness, and accuracy.

**Class 4: Class Discussion**

The teacher will lead in a class discussion bringing together various ecological concepts and terms that have come up throughout the unit. The goal is to bring together the concepts of various activities together and make connections between the concepts covered in the unit. The students are to apply their understanding of the material being covered into the discussion.
Fist the students will separate into groups, each group will choose a secretary (to write things down), a Speaker (to present to the class) a Leader (to pick on who speaks during the group discussion) and a mediator (person to ease any tension between the group). The students will receive a worksheet as follows:
Introduction to Ecology and Environmental Science Worksheet # 1

Discuss and answer the following questions among your group. Choose a secretary, leader, speaker, and mediator for your group. Make sure you listen to each other, are fair, open-minded and polite.

1) How are organisms categorized?

2) What are basic needs?

3) What is a habitat?

4) What determines what habitat an organism inhabits?

5) What is a food chain/web?

6) Why is the food web important to the ecosystem?

7) What is a biome?

8) Name four biomes and briefly describe them?

9) What are your basic needs?

10) What is your habitat, and what category would you fit in (herbivore, carnivore, omnivore, scavenger, decomposer etc.)?
Once all groups have completed the worksheet, each group will be given a change to present. The speaker of each group will tell the class what his/her group came up with. The teacher will begin a list on the board of any key ideas presented by each group. Once all groups are spoken for, the teacher will open the class to a class discussion. During this time the teacher will correct any misunderstandings and further explain the connections between these ecological concepts and the student’s everyday lives. The teacher will focus this time on the terms and concepts learned in this unit, in perspective to humans as animals who also fall into these concepts.

The goal of this activity is for the students to understand how to apply these ecological concepts in perspective to their everyday lives. The students will be able to make connections between their knowledge, understanding, research and application of the material being studied. For this activity the students will be evaluated on their class participation, and ability to function within a group.

Class 5: Environmental Issues/ The Role of The Individual

This class will focus on the importance of the environment for both wildlife as well as our own well being. The students will be separated into their lab groups and will have to choose a new secretary, speaker, leader and mediator. They will discuss and answer the questions on worksheet #2.
Introduction to Ecology and Environmental Science Worksheet #2

Discuss and answer the following questions among your group. Choose a secretary, leader, speaker, and mediator for your group. Make sure you listen to each other, are fair, open-minded and polite.

1) What is an environment?

2) Describe your environment.

3) What are your basic needs for survival?

4) Where are you in the food web?

5) What effects does the environment and other organism have on you and your means of survival?

6) What are some environmental concerns, and how can we protect and restore the environment?
Once each group has completed the worksheet, the speaker will present the groups answers to the class. The teacher will once again write any major ideas on the board. Once all the groups are accounted for, the teacher will focus the class on the importance of the environment and raise various environmental issues such as pollution, too much garbage, hunting animals, cutting down trees, etc. The teacher will also discuss various things that can be done to save and protect the environment. The teacher will ask the class what kinds of things they think can be done to help solve some of the problems in the environment. The teacher will write on the board any positive suggestions made. The students will be assigned to write to their congressman a letter, detailing any environmental concerns they have and what they would like to see done to improve their environment.

The goal of this class is to increase the awareness of environmental issues and the student’s role in the environment. Because environmental science is an interdisciplinary discipline, the students are encouraged to voice their opinion and express themselves politically as citizens of the United States.

**Classes 6-9 of week # 2- Environmental issues and Endangered Species**

During this class the students will conduct in class and outside of class research on an endangered species of their choice. On Monday the class will take a trip to the school library and research information on their particular species. They are to take out books and bring them back to the classroom with them. Once the students return to the classroom they are to sign up for computer time, to conduct Internet research. Because there are limited computers in the classroom each student will be allotted a certain about
of time, to give each student the opportunity to use the Internet. While the some students are on the computers conducting Internet research, the other students are to be conducting research at their desk with the books from the library. The students are to continue to work in this manner from Monday until Thursday. They are expected to work on this project inside and outside the classroom. Here is an example of the project outline that is provided for the students.

**Endangered Species Project Outline**

1) What is an endangered species?

2) What causes a species to become endangered?

3) Name of species

4) Description of the species basic needs (using terminology learned in class- herbivore, carnivore, omnivore, scavenger, decomposer, producer, consumer, biomes etc.)

5) What habitat does the species you choose need for survival

6) Why has this organism become endangered?

7) What can be done, if anything, to help this endangered species from becoming extinct? (Be sure to define what the word extinct means)
The students will be evaluated on their neatness, accuracy and ability to answer, within their report, the questions outlined for them. The goal of this project is for the students to apply the terminology used in class, understanding of major ecological concepts and research skills in a meaningful way.

**Class 10 – Last day of unit**

On the last day the students hand in their final reports at the beginning of class. Once all the reports have been collected, the teacher will begin a short discussion on things that the students themselves can do to help the environment. The teacher will introduce the ‘Triple R’ concept (Re-use, Reduce, and Recycle). As a class they are to generate a list of simple and easy ways people can help out the environment.

The class will then separate into lab groups, using old newspaper, a strainer, food coloring and water; the class will make their own recycled paper. With this paper they are to make cards for someone special, a sign for their room, or any other creative idea.

The goal of this activity is for the students to realize simple ways of improving the environment, and apply these concepts, by making their own paper.

The ultimate goal of this unit is to encourage group learning. The unit introduces students to common scientific terminology, while making sure that students themselves understand the material and are able to present it in front of their peers. Ultimately, the unit allows the students to learn new material, understand major concepts, understand how to apply those concepts in the real world and be able to formulate relationships between said concepts.
<table>
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<tr>
<th><strong>Activity</strong></th>
<th><strong>Discussion</strong></th>
<th><strong>Application</strong></th>
<th><strong>Understanding</strong></th>
<th><strong>Knowledge</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Students are presented with the key terms and their definitions. (Herbivores, carnivores, omnivores and decomposers)</td>
<td>Introduction to Biomes</td>
<td>Group effort in creating a mini-biome.</td>
<td>Discussion on the importance of the environment for humans as well as wildlife.</td>
<td>Discussion on the importance of the environment for humans as well as wildlife.</td>
<td>Introduction to threatened and endangered species</td>
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<tr>
<td><strong>Knowledge</strong></td>
<td><strong>Evaluation</strong></td>
<td><strong>Application</strong></td>
<td><strong>Understanding</strong></td>
<td><strong>Knowledge</strong></td>
<td><strong>Evaluation</strong></td>
</tr>
<tr>
<td>Students gain knowledge of the terminology used to classify animals.</td>
<td>Students gain knowledge of different Biomes.</td>
<td>Applying knowledge of the biome</td>
<td>Students are to share their knowledge with each other.</td>
<td>Students are to share their knowledge with each other.</td>
<td>Students obtain the knowledge of threatened and endangered species.</td>
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<tr>
<td>Students will have an understanding of how animals are classified according to their basic needs.</td>
<td>Students have an understanding of the descriptions of various biomes and the ability to differentiate between them.</td>
<td>(Not Applicable)</td>
<td>Students are to share their understanding of the material covered.</td>
<td>Students are to share their understanding of the material covered.</td>
<td>(Not Applicable)</td>
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<tr>
<td>Students are divided into groups. Each student chooses a card. (One side of the card has a picture of the animal and a description in the other side).</td>
<td>Each group obtains one card per group, which will contain a description of a biome and a picture.</td>
<td>The students are to apply ecological concepts to themselves and their everyday lives.</td>
<td>As a class, a list of things that can be done to improve the environment will be created.</td>
<td>Students are to conduct research in and out of class in groups of four. This will continue throughout the week.</td>
<td>The students will have the ability to apply hands on approach in protecting the environment.</td>
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<td>The students are to establish what category the animal falls in and present to the class how they came to their conclusions.</td>
<td>Using the description of their biome they are to figure out what biome they have. They are expected to conduct research on their biome as a group.</td>
<td>(Not Applicable)</td>
<td>(Not Applicable)</td>
<td>(Not Applicable)</td>
<td>(Not Applicable)</td>
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<td>Each group is to create a food web using the animals chosen in the previous activity.</td>
<td>Each group will put together their group’s research and pictures to create an informative poster.</td>
<td>Using classroom materials the students are to re-create a mini-biome in a shoebox.</td>
<td>The students are to write a letter to their Congressman, describing their environmental concerns and what can be done to better the environment.</td>
<td>The students are to create a research paper with pictures describing a certain endangered species, and what can be done to help that species survive.</td>
<td>The students are to make recycled paper from old newspaper and create a card for someone special.</td>
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<td>Food chains are to be presented to the class with the posters are to be presented to the class.</td>
<td>The mini-biomes are to be Class participation</td>
<td>Each group is to come up with an outline of the students’ research papers will be graded, and an oral presentation</td>
<td>Participation</td>
<td>Participation</td>
<td>Participation</td>
</tr>
</tbody>
</table>
References:

**Bloom's Taxonomy of Educational Objectives:**


**The Connecticut Framework:** K-12 Curricular Goals and Standards (1998)

Designed to provide a framework for thinking about the knowledge, skills, and understandings that students should have. Not a state mandate, but intended to provide guidance to local schools and districts that are developing curriculum.