2007

Environmental education curriculum for the California Conservation Corps

Barbara Katherine Cook

ENVIRONMENTAL EDUCATION CURRICULUM FOR THE CALIFORNIA CONSERVATION CORPS

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Education:

Environmental Education

---

by

Barbara Katherine Cook

June 2007

ENVIRONMENTAL EDUCATION CURRICULUM FOR THE CALIFORNIA CONSERVATION CORPS

A Project

Presented to the

Faculty of

California State University,

San Bernardino

---

by

Barbara Katherine Cook

June 2007

Approved by:

[redacted]

Dr. Darleen Stoner, First Reader — June 8, 2007 Date

[redacted]

Dr. Gary Negin, Second Reader

ABSTRACT

This project was developed to provide curriculum for young adults in the California Conservation Corps to help them connect to their employment with attitude and knowledge acquisition related to the outdoors. The curriculum consists of seven lessons that meet the guidelines of a comprehensive environmental educational program. These activities assist members of the Conservation Corps to develop life skills, further their understanding and appreciation of their employment and connect to the environment. Each one of these lessons correlates to the California State Standards for science.

A constructivist approach was used for the development of these lessons to promote a sustainable lifestyle for students. Due to the nature of students' employment, an understanding and appreciation of environmental concepts are important to promote their knowledge of outdoors and sensitivity to the applicability of the setting for their jobs.

This curriculum was developed to introduce environment and environmental sensitivity to corps members and promote a lifestyle for the rest of their lives. It was based on the objectives for environmental

education from the Tbilisi Declaration that included awareness, attitude, knowledge, skills and participation.

ACKNOWLEDGEMENTS

I would like to recognize California State University, San Bernardino, and the College of Education for the opportunity to complete my Master's in Education. I would also like to thank the several instructors that have encouraged and enlightened my knowledge in the field of education. Dr. Darleen Stoner should especially be commended for her inspiration, knowledge and her direction in this endeavor. I will always be grateful for the privilege to have studied and experienced Dr. Stoner's expertise in environmental education that has been a chance of a lifetime.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

As a child I grew up in metropolitan areas, but spent many summers on the family farm in South Dakota. I was more fortunate than most because I had the best of both worlds. I knew the benefits of city life but learned the appreciation of the earth from my grandparents. Respecting the land, rotation of crops, care of animals and appreciating a beautiful sunset were instilled in me at a very early age. As my education progressed, I found in many subject matters the connection to those earlier years, which made learning more meaningful. The reading of Ralph Waldo Emerson and Henry David Thoreau in my high school years was much easier to grasp, and the field of science was a passion. I experienced portions of environmental education long before I even entered public schools and wished it had been part of the curriculum.

Environmental authors have written ón the issues surrounding education and the need to improve this system. Mitchell Thomashow wrote on the need to identify with the environment as a means to create a community or commons; thus the classroom can be a commons where

students can learn and learning about the "whole is far greater than the sum of its parts" (Thomashow, 1995, p. 181). David Orr believed that the problem was education itself. Education according to Orr needs "...to be instructed and disciplined, and it needs to harnessed to the goal of building humane and sustainable societies" (1994, p. 213).

The need to educate our young is vital, but another approach may be needed. According to the Educational Testing Service (ETS),"one third of those that enter high school do not graduate" (n.d., para. 1). If babies are born with the quest for knowledge, what stops that process? The answer may be that learning is no longer fulfilling the needs of the students.

Educators may argue many reasons for this educational failure: the breakdown of the family unit, urban environment, economics, and politics. These may be what plague the workings of the current system, but I believe it is the loss of connection to the community or earth. Students do not see the reason for learning or how the information taught connects to their lives. Thus, many students lose interest, feel alienated and stop

learning. The result: citizens who do not know how to sustain earth.

When defining environmental education it must first be understood that it is applicable to any subject matter whether at a school or work place setting. William Stapp et al. defined environmental education as "aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solutions" (2005, p. 34).

Schools across the country have included environmental education in their curriculum with a great deal of success. David Sobel (2005) wrote about several environmental programs in the classroom setting that have increased students standardized test scores and attendance. Environmental education in these school settings has enabled curriculum that provides interest and gives meaning to learning about the environment for the students.

Purpose of the Project

The purpose of the project was to develop a curriculum based on environmental education for the

California Conservation Corps, a program that attempts to reconnect young adults to a more meaningful life. A constructivist approach was used with lessons that emphasize environmental knowledge and awareness applicable to the outdoor work. The Corps' mission statement is "a workforce developed program that offers young men and women the chance to serve their state and become employable citizens through life skills training and hard work in environmental conservation, fire protection, and emergency response..." (2006, para. 1).

I teach the young adults employed with the local California Conservation Corps. Approximately half of these people are high school dropouts and are in need of their diploma. They are between the ages of 18 to 25 and have had little or no exposure with nature prior to their employment with the Corps.

Most grew up in urban areas such as San Bernardino, Rialto, Colton and Riverside. Working on environmental or conservation type projects for the state is eight to ten hours a day for these individuals. Most live at the poverty level and have become frustrated with their lives. They see the Corps as a means of obtaining their education and learning skills that will advance them with

their lives. They are searching to connect and regain their lives. After a year's worth of exposure to nature with the Corps, it is my impression that for many the connection has not been wholly made and this experience has been merely employment.

The Corps has a one-day class that is taught on conservation awareness during initial training. When these individuals are on jobs sites, any environmental education received is the responsibility of their supervisors. Yet, there is no set curriculum. There appears to me to be a thirst for this knowledge from the corps members.

This curriculum could be used on job sites and in the classroom. The California Conservation Corps requires all members to complete at least three hours of educational time a week. Thus, this curriculum already has time allocated and implementation would be an easy step to making employment more meaningful and schooling more desirable.

Significance of the Project

This project is significant because corps members do not always connect to their employment nor do they

connect to the environment, even though they work daily in the out-of-doors in nature. It is my perception that when education occurs in nature it increases discussions on the purpose of their projects. It also creates interest, which creates questions, resulting in the outdoor experiences coming back to the classroom for further research. I have seen how those crews, which have experienced these lessons on job sites, have responded with a deeper meaning of their employment and feel more connected to their environment. Since the California Conservation Corps, purpose is to enhance one's life skills through enlightening on issues in the environment and instruction on conservation, this environmental education curriculum would fulfill this purpose.

CHAPTER TWO

LITERATURE REVIEW AND CONNECTION TO LESSONS

This literature review will address the definition and objectives of environmental education, outdoor education, constructivist theory and education for sustainability as important contributions to a curriculum written for the California Conservation Corps. These areas will provide guidance for objectives for lessons that promote job applicability, method of instruction, and a lifelong appreciation for the environment.

Environmental Education

William Stapp et al. defined in 1969 environmental education as education which is "aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solutions" (2005, p. 34). This was the first definition of environmental education.

The Tbilisi Declaration was a major contributor to further defining curriculum guidelines for environmental education. The Tbilisi Declaration, held in 1977, was the result of an intergovernmental conference on

environmental education held in 1977. The purpose of this conference was to recommend "framework, principles and guidelines for environmental education at all levels-local, national, regional and international and for all age groups both inside and outside the formal school system" (2005, p. 14). The objectives that were proposed were awareness, knowledge, attitudes, skills and participation.

The awareness objective was intended to be a beginning point of this lifelong process. The Tbilisi Declaration stated that this objective would provide "awareness and sensitivity to the total environment and its allied problems" (2005, p. 15). The Tbilisi Declaration supports the creation of lesson one, "Brainstorming About the Environment" establishes awareness of the different type of problems that the environment faces today. Through this lesson, students are asked to identify local issues and what personal contributions they have made to these problems.

Mitchell Thomashow later referred to awareness as the beginning of an individual's ecological identity. He believed that awareness might be found in three paths, "childhood memories, disturbed places, and wild places"

(1995, p. 18). These are experiences, possibly revisited childhood places or a vision about what a natural setting might have been. Because someone has no childhood memories does not mean that memories cannot be created later on in life. The Tbilisi Declaration supports lesson two, "The Importance of Water" which begins a student's awareness and sensitivity to the environment whether they have had past experiences or not. This lesson creates a sense of connection for students with Earth and all habitats.

Knowledge, according to The Tbilisi Declaration was for people to "gain a variety of experiences and acquire a basic understanding of the environment and its associated problems" (2005, p. 15). Knowledge of the environment should be in and out of the classroom. This would require a curriculum of ecological foundations. Therefore, further experience in nature would accomplish this objective. "Brainstorming About The Environment" provides students with the knowledge and the magnitude of local and world problems concerning the environment. This lesson enlightens students to current conditions in their own lives. This lesson would be an application of ecological knowledge and would be placing its relevance

in everyday life. Thomashow described that a simple walk can promote knowledge by, "the prospect of discovery, a journey to lands familiar or new, revealing new habitats and places both around and within" (1995, p. 36). The "Importance of Water" sends students on a journey around the world through the waterways of the worlds. This lesson provides students with the exposure of different lands, animals and habitats. Through this knowledge, they feel connected to other parts of the world. The Tbilisi Declaration knowledge objective is supportive of both of these lessons.

The attitudes objective, according to The Tbilisi Declaration was to help people "acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection" (2005, p. 15). Ownership or caring about an issue is at the cornerstone of this objective. This can motivate an individual to increase participation to resolve issues. "Brainstorming About The Environment" allowed students to form attitudes of concern about environmental problems. Through this lesson, students have stated that they did not know about many of these concerns and are eager to formulate

solutions. A continual theme in this lesson is of humans connecting to nature through an understanding of the impact that they have on the natural world and inspiring ownership. Hungerford and Volk stated that an "individual identifies strongly with the issues because he/she has what might be called a proprietary interest in it" (2005, p. 317). If the property or habitat individuals feel ownership towards or care about were threatened then a personal sense of protecting what belongs to them would occur because of their attitude of ownership. Through "Importance of Water" lesson, students feel a connection to all that inhabit the Earth and a sense of peace as they visit the many parts of the world. After experiencing this travel, students have expressed many interests in the possible losses around the world such as the Polar Bears and the de-forestation of the Rainforest. This is the attitude that The Tbilisi Declaration desired.

The skills objective, according to The Tbilisi Declaration was based on acquiring "the skills for identifying and solving environmental problems" (2005, p. 15). These skills according to Doug Knapp are "critical thinking, problem solving and effective

decision-making skills..." (2005, p. 350). Thus, individuals should consider possible actions and the possible outcomes of their actions. According to Knapp that would mean to "weigh various sides of an environmental issue to make informed and responsible decisions" (2005, p. 350). "Brainstorming About The Environment" develops student's skills in recognizing environmental issues locally and globally and developing possible solutions. Students have developed many sound and reasonable solutions to environmental problems after this lesson. The immediate success was recycling. The Tbilisi Declaration skills objective requires students to identify problems, which is a major objective to this lesson. The lesson, "Importance of Water" promotes critical thinking through analyzing the connection of water to all that inhabit the Earth and the impact that humans have on the natural world. The Tbilisi Declaration requires that students develop this ability. Students have taken this lesson and discussed the problems with pesticides and toxins in the air and nuclear accidents. They begin the realization of how these issues could spread globally. This ability to come to these conclusions was critical thinking.

Participation is the final objective from The Tbilisi Declaration. Participation was defined "to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems" (2005, p. 15). This objective is a culmination of an individual's awareness, knowledge, attitudes and skills and using those objectives to achieve responsible behavior. "Brainstorming About the Environment" and "Importance of Water" are the first two lessons of this curriculum. Students actively engaged in-group discussions, mostly for the first times in their lives and presented possible solutions for environmental concerns. Through these two lessons and the remaining lessons of this curriculum students are actively engaged in the activities and asked to provide awareness to the issues presented, develop basic knowledge and provide skill application to a problem by producing possible solutions. The reasons for their projects are further understood and appreciated which is a direct result of their exposure to this curriculum and supported by The Tbilisi Declaration.

These objectives from The Tbilisi Declaration were a defining step in creating environmental education

curriculum. These are the objectives the environmental educators utilize when creating curriculum in this subject matter. These objectives are the basics of a solid environmental educational program, which all support the definition of environmental education as defined by Stapp et al (2005).

The Tbilisi Declaration objectives-awareness, attitudes, knowledge, skills and participation were utilized as a basis of development and contributed to the lessons for the California Conservation Corps.

Outdoor Education

The objectives for environmental education and outdoor education follow a similar path promoting responsible citizens to the environment. According to Ford and Blanchard, the values that an individual might develop in an outdoor program would be "love of the land and pride in country, the understanding and practice of democracy, the strengthening of social institutions and the development of conservation attitudes" (1985, p. 11). Love of land and development of conservation attitudes are also values that are desired in an environmental

educational curriculum such as the one being addressed in this project.

Clifford Knapp stated that the thought process that works closely with outdoor education contains four areas. The first area was that "knowledge and expertise are the foundations for thinking and learning about certain topics" (Knapp, 1992b, p. 1). The second area was that "the disposition to use skills and knowledge, as well as to possess them, is part of learning" (p. 1). The third was "social communities play a key role in developing thinking abilities" (p. 1). The final area was "apprenticeships are powerful frameworks for learning" (p. 1). "Brainstorming About The Environment" and "Importance of Water" are two lessons that are supported by Knapp's statement regarding the thought process of outdoor education. Both of these lessons provide students knowledge of environmental issues, develop the skills for providing possible solutions, connect students to their local communities and actively engage students in activities that form bonds to the environment. All four of these characteristics support the goals that one would want to see in an environmental curriculum of the California Conservation Corps. Knowledge, skills,

communities and apprenticeships are words that are used when developing a program in environmental education and certainly support an outdoor education curriculum.

Ford and Blanchard described goals for outdoor education using descriptions such as "responsibility for the preservation, care and wise use of the natural environment" (1985, p. 11). They stated that outdoor education promoted "awareness and understanding of the inter-relatedness of all nature" and that individuals needed to understand "man's heritage of outdoor living" (1985, p. 12). Ford and Blanchard also wrote that outdoor education promoted "resourcefulness, self-reliance and adaptability" (1985, p. 12). "Brainstorming About The Environment" is a lesson that begins students on the path to becoming concerned citizens. After identifying the local environmental issues, students responded to what their major concerns were about the environment. Their responses usually include that they were unaware of these issues and are willing to assume responsibility for their contributions. The "Importance of Water" introduces students to their connection to all that inhabit the Earth. Students comment on feeling connected to what they envision while listening to the reading and a sense on

"calm" and "peace" overwhelm them. Ford and Blanchard's goals for outdoor education support both of these lessons.

Clifford Knapp outlined six possible strategies that assist in obtaining those objectives. These are "meeting experts on the job..." (1992b, para. 12); "thinking aloud together..."; "forming concepts from experience..."; "examining natural and cultural objects..."; "using outdoor social groups..." and "generating interesting questions..." (para. 13). " Brainstorming About The Environment" allows a student to think out loud by listing issues and create possible solutions together, examine the natural world in a group and generate questions regarding possible solutions. This lesson brings students together with common goals. Participants in the "Importance of Water" share an experience and through that sharing find that they all react in a similar manor. They form a bond and become more open with responses. Knapp's strategies are the results that are achieved through these two lessons. Through corps members employment they are exposed to many experts in the field, such as fire rangers, biologist, park rangers, city officials and environmentalist. This exposure only

enhances the experiences in these lessons for corps members and furthers a lifelong understanding of the environment.

On an emotional level, Ford and Blanchard state, "Emotions or attitudes one develops through outdoor pursuits may relate to the self, to others, to society and to the environment" (1985, p. 11). The kinds of experience that are being implemented with these two lessons, when presented on a level presented by Ford and Blanchard, develop a locus of control with a positive outcome and make knowledgeable decisions regarding the environment.

Outdoor education relies on nature to provide the classroom. To teach about the environment without being in the environment is losing the connection to the subject matter. Knapp described schooling without outdoor education when he wrote, "Schooling is much like learning to ride a bicycle by reading about it, diagramming it on the blackboard, dissecting the bicycle--but never actually riding it" (1992b, p. 2). Thus providing no actual experience in riding the bicycle is similar to discussing the environment in the classroom only from indoors. Learning about the environment must take place

in the natural setting. "Brainstorming About The Environment" and "Importance of Water" are two lessons that were taught indoors but both would be better served taught in an outdoor setting. Students would experience first hand the impact of the environmental issues with "Brainstorming About the Environmental" and experience the water and connection by sitting by a stream with "Importance of Water". This only heightens the experiences.

Although the lessons for the California Conservation Corps are frequently taught in an indoor setting, the application to outdoor-environmental education was always an intended outcome. Responsibility for preserving the environment, experiencing the natural world, and forming concepts to assist corps members with their outdoor work are featured in the lessons developed.

Constructivism

The constructivist approach toward teaching and learning is well supported through environmental and outdoor education literature. Constructivist learning is traceable as far back as the eighteenth century with the philosopher Giambattista Vico. Vico "maintained that

humans can understand only what they have themselves constructed" (in Thanasoulas, n.d. para. 1). Two pioneers in constructivist teaching were John Dewey and Jean Piaget. Epstein and Ryan stated that Piaget believed that "learning was discovery" and "individuals are to be formed who are capable of production and creativity and not simply repetition" (Epstein & Ryan, 2002, para. 13) Epstein and Ryan also stated that Dewey believed that "student's knowledge grows from experience" (para. 12).

Constructivist learning theory is a critical element in a strong environmental education program. These both "require students to take an active role in learning and building on factual knowledge to improve investigation and critical thinking skills" (Klein & Merritt, 1994, p. 20). In both "Brainstorming About the Environment" and "Importance of Water", students were motivated to develop these skills. Created list of potential environmental issues, investigated causes, created solutions and connection to the environment all of which were skills that were utilized and developed. "A component of constructivism is demonstrated by activities in environmental education curriculum guides" (p. 20).

Teaching and learning in constructivism has been guiding the development of many of today's environmental materials. An example of these curriculums is Project Learning Tree (American Forest Foundation). Project Learning Tree, promotes the use of constructivist learning, and uses key ideas to develop their curriculum. These key ideas related to local issues, use student's prior knowledge and guidance through a lesson and interaction with their peers throughout the lessons. Specific words were used in these lessons such as classify, analyze and predict while asking opened ended questions. Authentic assessment was being used as means of measurement to qualify the student's learning. Project Wild, Population Connection, and many other environmental curriculums also used the constructive approach to learning. The lessons created for the California Conservation Corps curriculum followed the same approach.

Constructivism learning theory and environmental education also share various goals including ecological foundations, conceptual awareness, investigation and evaluation and action skills. Constructivism uses student centered instruction, group interaction and authentic assessment. With constructivist learning "Students should

be actively engaged in classroom learning tasks such as experimentation, investigation, observation and discussion" found in Klein & Merritt, 1994, (p. 16). These elements are all in environmental education and its goals. "Brainstorming About the Environment" required students to actively engage in classroom discussions through experimentation and investigation of environmental issues whereas "Importance of Water" ask students to experiment and investigate their connection to the natural world that was followed with group discussions.

Jerome Bruner believed that learning had to be social in nature. According to Bruner for learning to take place, there must be three learning principles: "Readiness..., spiral organization...and going beyond the information given" (in Thanasoulas, n.d. para. 5). When referring to readiness, Bruner believed that instruction had to be equal with the student's experiences so this would stimulate ability to learn. "Brainstorming About the Environment" starts with presenting corps members with the issues that are of concern for the environment and the impact that this has on their lives. This lesson began corps members on their path to becoming concerned

citizens for the environment. This makes learning more meaningful. Bruner also believed that spiral organization builds knowledge by using current knowledge of students to create even more. "Importance of Water" is the next lesson that built the students connection to the natural world. Their knowledge of issues about the environment only created a more meaningful connection to the natural world and heightened the experience. This principle would make curriculum more understandable to the student and more personal. After students experience "Brainstorming About the Environment and "Importance of Water" they feel more concerned and connected to the Earth. Their employment became more meaningful and they had a desire to learn more. This has been seen by daily stories of what they witness on their job sites. Through this process, students would reach beyond the information provided due to the motivation to learn.

Epstein and Ryan described learning as "active process in which the learner uses sensory input and constructs meaning out of it," they also included that "physical action and hands on experience" (Epstein & Ryan, 2002, para. 4) made learning more meaningful and more memorable. Epstein and Ryan also believed that

"learning involves language, learning is a social activity" and "learning is contextual" (para. 4).Through "Brainstorming About the Environment" and "Importance of Water" these activities require that there is an awakening of the corps members senses. The lessons are visual, emotional and thought provoking. As corps members work through these lessons group orientation is required and hands on experience. Both lessons provided experiences with their employment more meaning. Environmental educators work towards building these same experiences in the natural world.

Constructivisms, environmental and outdoor education often have similar results. They require students to utilize past knowledge, expand their knowledge by asking questions and interact with others to formulate and reflect in their own knowledge.

Education for Sustainability

In support of sustainability, in 1994 the National Forum on Partnerships Supporting Education about the Environment was held and produced a document called Education for Sustainability: An Agenda for Action. This document included recommendations for integrating

sustainable components such as lifelong learning, interdisciplinary approaches to learning, system thinking, partnerships, multicultural perspectives and empowerment to form opinions into educational curriculum.

Education for sustainability includes not only concerns about the environment, but also social and economic matters. The following is a definition of sustainability from the Brundtland Commission, formally the World Commission on Environmental and Development.

> Education for sustainability is a lifelong learning process that leads to an informed and involved citizenry having creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and cooperative actions. These actions will help ensure an environmentally sound and economically prosperous future. (in National Forum On Partnerships Supporting Education, 1994, p. 1)

This statement encourages instruction on the subjects of environmental, economics and equity along with the core curriculum. In theory, these subjects would lead to "environmental protection, economic objects, and social

justice" (1994, p. 1) and promote the lifelong learning of these subjects.

The need for education for sustainability increases as people deplete the natural resources, which cannot be replaced. During this meeting of the National Forum on Partnership Supporting Education about the Environment, six themes were recommended for educating for sustainability. These themes are as follows: lifelong learning, interdisciplinary approaches, system thinking, partnership, multicultural perspectives and empowerment.

Lifelong learning includes formal and non-formal learning. Learning begins in the home, transfers to formal schooling and then on into the workplace. This process stretches beyond the boundaries of the classroom into business and communities. Lifelong learning also supported by according to The Tbilisi Declaration, included that education should be "responsive to changes in a rapidly changing world" (2005, p. 13). Thus, education must meet the needs of citizens. "Brainstorming About the Environment" provided corps members with an insight to problems that the world face today. Through this lesson, students had an understanding of their own personal contributions to these problems and alternative

actions that they could continue throughout their lives. Recycling littering and contamination of watersheds were major changes that I have witnessed. "Importance of Water" lesson created a connection to the Earth. Corps members expressed their understanding of how everything is connected on Earth and how humankind fitted in the natural order of a sustainable life. These two lessons created a mindset for lifelong learning and produced citizens for a sustainable life.

Interdisciplinary approaches mean that school subjects include social, economical and environmental topics on sustainability and their interconnections with one another. This approach would bridge all disciplines in education. "Learning about sustainability necessitates breaking down the wall between disciplines, perhaps by focusing on a single real-world issue addressed from various perspectives" (National Forum On Partnerships Supporting Education, 1994, p. 4). The integration of environment problems and sustainability should be included in natural sciences, humanities and economics. "Brainstorming About the Environment" and the "Importance of Water" are two lessons that included local and worldwide environmental issues that involved knowledge of

natural science, economic impact on the environment and local history.

System thinking is a skill that is not often taught in the traditional school setting. The first goal is knowledge. The inclusion of sustainability in curriculum would open the doors for "problem solving, conflict resolution, consensus building, information management, interpersonal expression and critical and creative thinking" (National Forum On Partnership Supporting Education, 1994, p. 5). Employers want employees who have skills such as problem solving, critical and creative thinking, and can express themselves. Education for sustainability develops those skills through its curriculum and style of learning. Education for sustainability promotes informed and responsible citizens but also desired employees for economic growth within the corporate world. "Brainstorming About the Environment" required students to analyze current problems, assess their impact and create solutions. "Importance of Water" created the connection and ownership of the environment. Through these two lessons, students developed the connection, ability to critically analyze and provide

solutions. Thus provided the ability to approach issues systematically and create the desire for resolution.

Partnerships for sustainability would encompass all aspects of a community. The partnership would reach out of the formal classroom to community members in business and government for their expertise in economics and social aspects. The private and public sectors would unify to exchange information, support learning and build alliances to work toward a common goal of sustainability. According to Sobel, placed-based education in a community would accomplish this goal. This would be "a means of inspiring stewardship and authentic renewal and revitalization of civic life" (2005, p. iii)."Brainstorming About the Environment" and "Importance of Water" creates a basic knowledge of the environment and place-based education. The curriculum addresses problems for students to be able to work alongside other agencies and have a deeper understanding of the projects and possible solutions.

Multicultural perspectives would include curriculum with a diverse cultural approach. The curriculum should be reflective of the area in which people live or that contain the "commons" perspective. The curriculum should

encourage students of all cultures to follow careers in environment and science studies. "One key to a sustainable future is the realization that we are all citizens of one Earth, dependent on common resources and on one another" (National Forum On Partnership Supporting Education, 1994, p. 60). "Brainstorming About the Environment" and "Importance of Water" curriculum has been adapted to fit the needs of corps members for the Inland Center located in San Bernardino County. This curriculum can be adapted to any of the centers for the California Conservation Corps. This curriculum also stresses that these issues are worldwide and effect all that live on Earth.

Empowerment means that students would be encouraged to voice their opinions, create new ideas and take action. Community service, nonformal education and exchanging opinions are means of taking action and gaining knowledge by listening to others. Students of sustainability education will become "citizens who are prepared to participate responsibly in a sustainable society" (National Forum On Partnership Supporting Education, 1994, p. 6). "Brainstorming About the Environment" promoted corps members to voice their

opinions regarding the conditions of the environment, create possible new solutions and ask them to take action in their own personal lives. "Importance of Water" created the connection to the natural world and allowed students to experience the connection. The desired result was corps members that become citizens for a sustainable society.

In creating this program for sustainability, it was recommended that this program should be implemented in grades K-12 and undergraduate schools. It could start with simply establishing a "green school," meaning a school, which is "committed to reducing waste and helping the environment" (Green School Project, 2002, para. 1). Schools such as these implement practices, which reduce their own impact on the environment. Green schools could then become leaders in their community to provide examples of environmental and economical practices for success.

From this literature review, one can see how environmental-outdoor education and constructivism can contribute to the development of a curriculum for the California Conservation Corps with the result supporting education for sustainability. In this literature review,

only two lessons were highlighted but any of these seven lessons created could have been used. This literature review supports the creation of these lessons and supports the desired results of this curriculum.

CHAPTER THREE

DESIGN OF PROJECT

This project contains seven lessons for use by the California Conservation Corps program. These lessons are intended to be used within the Conservation Awareness class during initial training into the program. The purpose of this class is to create in these young adults an awareness of environmental issues, sensitivity to the outdoor environment where they are employed, an understanding of the value of their work in the projects during their employment and an appreciation and application of their environmental knowledge in order to promote a sustainable life. These lessons are also designed to be reinforced by follow-up discussions in an outdoor setting during corps members' fieldwork. The activities are designed to be used in order listed.

The constructivist approach of instruction was chosen because it was the method that best supported the goals of environmental and outdoor education. Environmental education supplied the definitions and objectives for this curriculum and outdoor education guidelines provided the most appropriate content. The

long-range purpose of this curriculum was to educate for a more sustainable lifestyle for the corps members.

The curriculum guide contains lessons that contain the Tbilisi Conference objectives, awareness, and attitudes toward the environment, knowledge of the environment, critical thinking skills and participation in helping with the environment. Each lesson has been correlated with the high school California Department of Education Content Standards for science to ensure that students are assured required science knowledge since many are completing their high school diploma while employed.

The author of this project created "Brainstorming About Environmental Problems" and "How Does the Natural World Work" activities. The "The Importance of Water" was developed from "Water Wings," Project WILD Aquatic (Council for Environmental Education, 2001), The development of this lesson was created form describing traveling around the world through the waterways of the Earth. "History of a Watershed" was developed by using the historical maps from "Color Me a Watershed," Project WILD: Science and Civics (Council for Environmental Education, 2002) and "Habitat, Habitat, Habitat" was

created from "How To Evaluate a Habitat" Project WILD: Science and Civics (Council for Environmental Education, 2002) by using the concept of the activities and background information. The chart from "How to Evaluate a Habitat" was altered from Project WILD: Science and Civics (Council for Environmental Education, 2002). The alteration is that all inhabitants of an ecosystem can be listed and not just a single species "How Much Soil Do We Really Need" was adapted from "Earth: The Apple of Our Eye" from Population Connection (2003) by using the step-by-step procedure in cutting the apple and adapted the background information. "Who Polluted the Santa Ana" was adapted from "Who Polluted the Potomac?" from Population Connection (2003) by reformatting the location of the river and providing California history. Permission to use the two activities from Population Connection has been obtained and letter is in Appendix B.

The following are the lessons that were created for the California Conservation Corps aligned with the Tbilisi Declaration objectives.

- Lesson One. Brainstorming About Environmental Problems

Major emphasis- Awareness

Minor emphasizes- Knowledge and Attitudes

- Lesson Two. The Importance of Water

  Major emphasis-Awareness

  Minor emphasizes-Knowledge, Attitudes and Skills

- Lesson Three. How Does the Natural World Work?

  Major emphasis-Knowledge

  Minor emphasizes- Awareness, Attitudes and Skills

- Lesson Four. How Much Soil Do We Really Need?

  Major emphasis-Awareness

  Minor emphasizes-Attitudes and Participation

- Lesson Five. Who Polluted the Santa Ana?

  Major emphasis-Awareness

  Minor emphasizes-Attitudes and Participation

- Lesson Six. History of a Watershed

  Major emphasizes- Knowledge and Skills

  Minor emphasizes- Attitudes and Participation

- Lesson Seven. Habitat, Habitat, Habitat

  Major emphasizes- Skills and Participation

Minor emphasizes- Awareness, Attitudes and Knowledge

These activities can be applied to many of the environmental projects done by corps members with the intention of creating a connection to the natural world and an interest in their job training. Lessons have been used in the Conservation Awareness class and field-tested on job sites for the Corps.

CHAPTER FOUR

CALIFORNIA CONSERVATION CORPS CURRICULUM

LESSON ONE
Brainstorming About Environmental Problems

Method

Students will engage in class discussion and receive notes on the environmental problems today. Students will complete environmental problems and losses page. Students will share results of the student pages with the class.

Objectives

1. Students will be able to identify some environmental problems that affect earth today.
2. Students will be able to identify the losses in the environment due to these environmental problems and provide possible solutions to these problems.
3. Students will develop awareness involving environmental issues, acquire knowledge on the causes of these issues and respond with an attitude of concern for the condition of the environment as described in the Tbilisi Declaration.

State Standards

Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

Duration

30 to 45 minutes

Setting

Indoor/outdoor

Materials

Student page: Problems in the Environment; Student page: Environmental Problems/Losses; clipboards if taught outdoors; and pencils.

Preparation

Make copies of Problems in the Environment and Environmental Problems/Losses pages for students.

Activity One

Procedure

1. Discuss with the students some of the environmental issues today. Handout, Problems in the Environment, student page to students. Review this handout with students. Have them give examples of local issues.
2. Handout to students Environment Problems/Losses student page and complete the portion of the handout labeled environmental problems using Problems in the Environment student page. Make sure students understand that they are not to use global warming or pollution. They need to be more specific on the causes of these major problems.
3. Students will share with class the list that they have compiled regarding the environmental problems that are local and global.
4. Students will answer the following questions in a group discussion.

Discussion Questions

1. What are the local environmental issues that affect your life?
2. Which environmental issue do you feel you could have an impact on by your actions?
3. Which is your urgent concern today about the environment?

Activity Two

Procedure

1. Discuss with students the effects that environmental problems have in their area and how they relate to sustaining life on the plant.
2. Have students continue by filling out the rest of the student page on the effects of these environmental problems on the local communities and the planet and what they can do to help solve these problems?
3. Have students share with class the effects that these problems are having on local communities and earth. Make sure that students understand that all of these problems have a result of loss of wildlife habitat, pollution or global warming.
4. Students will answer the following questions in a group discussion.

Discussion Questions

1. What are the some of the losses created by humankind the environmental faces today?
2. What effect will these losses have on your own life?
3. What are some ways that humans can stop these losses?
4. Can you help with some of these losses? How?

Evaluation

1. Discuss with students a need that all are responsible for these problems.
2. Discuss with students that one person can make a difference and that if all do their part it would have a lasting effect on their community and their planet.
3. Discuss with students if they are more aware of their actions and if they feel part of the movement to cleanup the earth.

Resources

Boling, M., Dunnill, A., Inger, K., Moore, M., Ramsey, S., Vineyard, Z. (n.d.). Pesticides & the environment. Retrieved March 11, 2007, from http://www.msu.edu/~ramseys3/lbs172/index_files/Page357.htm

Environmental Protection Agency. (n.d.). High school environmental center. Retrieved March 11, 2007, from http://www.epa.gov/highschool/

H. John Heinz III Center for Science, Economics and the Environment. (2002). Soil Erosion, Retrieved March 11, 2007, from www.heinzctr.org/ecosystems/farm/soil_ersn.shtml

Pimentel, D.,Huang, X., Cordova, A., & Pimentel, M. (1996, February). Impact of population growth on food supplies and environment. Presented at AAAS Annual Meeting, Baltimore, MD. Retrieved March 11, 2007, from http://dieoff.org/page57.htm

Student Page
PROBLEMS IN THE ENVIRONMENT

Air: Air pollution is a major issue in many large cities in the United States. Air pollution stems from the exhaust in cars, busses and trucks; factories exhaust waste and weather factors such as extreme temperatures and wind patterns. In California, many of these issues exist.

Water: Run off from melting snow and rain. As it runs towards a major body of water it can pick up pollutants along the way. These pollutants can be fertilizers, oil, soil, and other toxins. Once the water combines with the rivers or streams the contamination process only increases. Changing the natural flow of water can also lead to pollution and the destruction of habitats and wetlands. Building of dams on rivers and streams can promote flooding and destruction.

Waste/recycle: Recycling is the process of collecting materials that don't decompose in a landfill or don't decompose at all and changing them into raw material that could be made into new products. This process of recycling waste has lessened the amount of waste going to landfills. Products which all people can recycle are paper, cans, plastic containers, cardboard, cell phones, old tennis shoes and ink refills to computers.

Soil Erosion: Soil erosion reduces the quality and quantity of soil and thus the ability to support plant growth. Erosion can create diverting of stream and rivers which can cause flooding and loss of crops. Erosion can create problems with water quality and eventually lead to problems with water treatment plants and reservoirs.

Population/urban sprawl: As population grows on earth it is putting a great deal of pressure on natural resources and food supply. Natural resources are being depleted, such as quality soil to sustain plant growth, clean air to breathe and clean water, while still trying to maintain standard of living for humans. As population grows and cities are built to house the population growth, natural resources must be considered in this planning.

Chemicals/Pesticides: Pesticides are used to control insects. Herbicides are used to control weeds. Both of these are chemicals. Soil and water can be contaminated by the use of these chemicals with run off. A misuse of pesticides and chemicals can create problems for animals and humans health. Proper application and disposal must be exercised with use.

Student Page
ENVIRONMENTAL PROBLEMS/LOSSES

Problems	Losses to the Environment	What can I Do?

LESSON TWO
The Importance of Water

Method
Students will listen to background information and participate in class discussion by answering questions. Students will listen to the journey of water on the planet and respond to questions.

Objectives
1. Students will be able to describe the interrelatedness of the world's waters.
2. Students will be able to understand that all that inhabit the earth are connected to one another.

3. Students will develop an awareness of the importance of water to the environment, acquire knowledge on the connection of water to all living organisms, and form attitudes of concern for maintaining clean water while developing the skills necessary to understand that water is a global issue of concern as described in the Tbilisi Declaration.

State Standards
Ecology
6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:
    e. Students know a vital part of an ecosystem is the stability of its producers and decomposers.

Duration
30-45 minutes

Setting
Outdoor/indoor

Background Information
All water on Earth is joined together to form one great mass of water. Snow melts and rain runs to streams that run to rivers, which then will run to an ocean. These oceans join to form one body of water. All water on Earth is connected. Everything on Earth is connected to this global body of water, from drinking water from a fountain to watching it rain in the forest. Water is interwoven by running across the land, through rivers, as ground water, and transported through air with the processes of evaporation, condensation, and precipitation. Water makes up three-fourths of the planet and is an intricate part of all life on Earth. Humans are made up of 75% water, and water is the basic component of cellular structure. All life on earth connects to water and all life on earth is dependent upon water to survive. All life on Earth is connected.

Activity One

Procedure

1. Share with students the background information provided with this lesson.
2. Have students respond to questions the background information reading.

Discussion Questions

1. In early childhood, did anyone have any experience with nature? Make sure to ask whom they were with and age.
2. How did those experiences make you feel?
3. Would you like to return to that place to experience nature again?

Activity Two

Procedure

1. Read students the following regarding traveling the world through water.
2. Have students answer the questions following the reading

Reading

Traveling the World Through Water

You are going to relax and close your eyes and try to visualize and feel what I am going to read to you. You are sitting by your favorite stream, river or lake. There is a soft breeze that is blowing and it is hot. You take your shoes off and put your feet in the water. You feel the water on your feet moving around them. The water is cool and clean and you begin to wonder where this water connects to other bodies of water. The water now feels stronger as you begin to think of the connection that this water is making to a larger body of water. It runs over your feet and swirls around and you begin to think of the ocean's current and all the waterways it must take to reach the ocean. You see its path past trees and plants. You even see the occasional deer or coyote that takes a drink from it. You see the birds that fly above it and fish that swim in the water. You feel the water running past little towns, then eventually larger cities as it travels and finally making its way to the ocean. Now you feel the connection to all the oceans and you have now become part of those oceans. You travel the currents through the Pacific Ocean to see the whales run along the California coast and to the Artic Ocean to see the Polar Bears dive for food. Oh, look at all those Penguins along the shoreline. Through the water on your feet you are connect to one body of water that extends all around the earth. You now travel to the North Atlantic where you see Right Whales lifting out of the water to spray you. You begin to relax and let the current carry you. You travel to the Mediterranean Sea to look along the shoreline to see Monk Seals lay in the sun. A young Greek boy waves to his father fishing offshore.

The water carries you down the Suez Canal past the ancient Pyramids to the Indian Ocean where the current rushes you to the Pacific Ocean. You drift past many islands and occasionally a Humpback whale surfaces to take a breath and causes the water to rush past you. The current now takes you to the Amazon river where the water slows a bit and becomes warm. The air becomes more humid and many grass huts line the waterway. You see colorful birds and feel a soft warm breeze rush over you. You feel connected to all that you have seen. The current rushes past you to a very blue and warm body of water. In the Caribbean Sea you see Palm Trees and a Dolphin gives you a nudge and swims past you. You float and feel the sense of connection to all bodies of water. It flows threw you and is part of you. Now you hear music and see people dancing in the street. This must be New Orleans and the Mississippi is pulling you north. You see Riverboats and the mighty banks. Children are fishing on the shore and grand old plantations peak through the Weeping Willows along the shore. The water encompasses the earth and you are now part of all that exist on earth. Now it is time to return to that water where you sat with your feet dangling in the water. Travel back from all that you felt part of to where your feet are placed in the water. When you are ready open your eyes.

Procedure

Have students sit quietly and tell them that this experience is different for each one of them. Have them think about which place their favorite was and think about why this place is their favorite.

Discussion Questions

1. Which place was their favorite? And why?
2. Did you visualize a connection that is global?
3. What is the global connection?
4. Do you feel connected to the Earth?

Evaluation

1. Have students discuss how a catastrophe that happens halfway around the world can affect people who live in California?
2. Can you think of any issue that has happened in the past or currently that is affecting the world globally? Where is the connection that makes this global?

Source

Council for Environmental Education, (2001). Project WILD aquatic. Houston, TX: Author.

Traveling the world through water adapted from Project WILD aquatic, "Water Wings" activity.

LESSON THREE
How Does the Natural World Work?

Method
Students will be given student page, About the Different Cycles, and answer the discussion questions. Students will complete the handout on the different cycles that they observe while on a job site.

Objectives
1. Students will understand that carbon, water, oxygen and nutrient are cycles of nature.
2. Students will understand how humans are part of all these cycles and processes.
3. Students will understand how the cycles inter-relate to one another.

4. Students will develop knowledge of the natural cycles of the environment, gain an awareness of the importance of these cycles for sustaining life, develop attitudes of concern for preserving these natural cycles and acquire skills in evaluating a natural habitat for possible dangers as described in the Tbilisi Declaration.

State Standards
Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

d. Students know how water, carbon, and nitrogen cycle between a biotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.
e. Students know a vital part of an ecosystem is the stability of its producers and decomposers.

Biogeochemical Cycles

Each element on Earth moves among reservoirs, which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles. As a basis for understanding this concept:

a. Students know the carbon cycle of photosynthesis and respiration and the nitrogen cycle.

Duration
Two 60 minutes sessions

Setting
Indoor and outdoor

Materials

Student page: About the Different Cycles, Student page: Observations Cycle Chart. Clipboards and pencils.

Preparation

1. Make copies of all handouts for students.
2. Select an area to observe which has a stream, vegetation and wildlife.

Activity One

Procedure

1. Students in class discussion will review About the Different Cycles handout.
2. Students will answer the following questions regarding those cycles.

Discussion Questions

1. At what point do these cycles overlap?
2. If one cycle were interrupted due to a natural force or human influence what effect would this have on the ecosystem?

Activity Two

Procedure

1. Students will observe a designated area and list living and non-living components to this ecosystem on the Observation Cycle Chart.
2. Students will enter these living/non-living components on the Observation Cycle Chart.
3. Students will then determine the role that these components play within the ecosystem.
4. Students will answer the following questions.

Discussion Questions

1. Did you find components of each of the environmental cycles?
2. Did you find signs of any environmental problems in this area? Which ones? If yes, did it have an effect on any of the cycles?
3. Did you find a connection between these cycles and if so where?

Evaluation

1. How does the watershed system fit into the water cycle?
2. Ask students to evaluate climate change in your area and if it is causing pollution and loss of wildlife habitats?
3. Students need to evaluate how any interruption in any of these cycles can alter the habitats of that area.

Extensions

1. Have students research the changes in temperatures in Southern California for the past ten years. If there is a fluctuation in temperature, what are some of the reasons?
2. How does the change in these cycles affect the population of all living things?

Student Page
ABOUT THE DIFFERENT CYCLES

The Earth is made up of levels of organization: the biosphere, biomes, ecosystems, communities, population and organism. The biosphere is the entire planet. The biosphere is divided up into biomes, which can be either, ocean, tropical forest, tundra, desert, etc. An ecosystem is the population of a community of living and non-living organisms. A community and is all living organisms in an ecosystem. Population is members of a community that are of the same species. And an organism is a living thing.

In each ecosystem there are food webs, food chains and different cycles, which maintain life within the system. The balance of the ecosystem relies on the perfect balance of all of these entities to maintain a sustainable ecosystem. When any of these entities are interrupted or eliminated then there is a breakdown of the ecosystem.

Loss of a species can have a catastrophic effect on the survival of the ecosystem. It can damage a food web or chain or a cycle would lose the ability to produce the necessary by-product to promote life. All is dependent on maintaining a balance of existence for living things in unison.

The water cycle supplies the earth with water. Through evaporation, condensation and precipitation, water is recycled on earth through the atmosphere. Evaporation is the process of water becoming a gas from ponds, lakes, oceans, etc. Water vapor is released into the air to accumulate in clouds. Once accumulated in clouds the water vapor then condenses to become liquid again and returns to earth in precipitation. Precipitation is rain and snow, which falls back to earth, and the water is used once again for maintaining the ecosystem.

The carbon cycle provides the ecosystem with carbon. Carbon is needed for photosynthesis, cellular respiration and decomposition. Plants release carbon dioxide through their leaves and animals release carbon when they exhale. Cellular respiration produces carbon in both plants and animals with the oxygen and carbon exchange. Decomposers release carbon dioxide when the dead organisms breakdown. This is how carbon moves through an ecosystem and carbon is produced.

Oxygen is found in the air and in water. It is vital to all living organisms on the planet for sustaining life. Organisms use oxygen in cellular respiration and assists in releasing energy from stored food. Oxygen is used by plants and animals as is moves through the ecosystem.

Nitrogen makes up about 75% of the air on this planet. Nitrogen is an important component of protein, DNA and many other chemicals, which are important in sustaining life. Organisms do not use the nitrogen that is in the air but certain bacteria change this nitrogen into ammonia and nitrates, which are needed by plants. Plants take in the ammonia and nitrates that are used to make proteins and other chemicals. Animals take in nitrogen when they eat

plants. Through the process of decomposition, the nitrogen returns to the roots of plants for use again.

All systems in nature are linked together. These systems they can be studied separately but they are inter-related within an ecosystem and vital for sustaining life on Earth.

Resources

American Guidance Service, Inc. (2000). Biology. Circle Pines, MN: Author.

Student Page
Observation Cycle Chart

List your living/non-living components and then place a check in the appropriate box for the cycle, which it belongs. Then put the number of role it plays within the ecosystem which is listed at the bottom of the page.

Living/ Non-living	Water Cycle	Nitrogen Cycle	Carbon Cycle	Oxygen Cycle	Role in Ecosystem

Role in Ecosystem

1. Decomposer 2. Consumer 3. Producer

LESSON FOUR
How Much Soil Do We Really Need?

The procedure of cutting the apple and explanation was taken from Population Connections, " Earth: The Apple of Our Eye."

Method
Students will observe a visual demonstration on the amount of soil that remains on the planet to grow crops to feed the world. Students will answer questions regarding the demonstration on issues of crop and grazing rotation, soil erosion, human population, and issues which face the amount of viable soil today.

Objectives
1. Students will understand the need for fertile soil for production of crops.
2. Students will understand that soil erosion causes damage to habitats and crop production.
3. Students will understand environmental issues regarding soil erosion and possible preventative measures.

4. Students will develop awareness to the importance of soil for sustaining life, participate in developing alternative answers to local urban development and acquire concerned attitudes for California's agricultural land as described in the Tbilisi Declaration.

State Standards
Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size

Duration
45 minutes

Setting
Indoor/outdoor

Materials
Obtain apple, a cutting knife and paper towels

Preparation
1. Purchase apple and a sharp knife.
2. Have paper towels handy.

Activity One

Cutting the Apple: Follow steps 1-5 describing to students what the apple represents and then giving students the explanation that correlates with the description.

Step	Description	Explanation
Step 1 Whole Apple	This whole apple represents the planet Earth.	Today's population 6,583,519,515 in the world.
Step 2 Cut the apple in fourths	¾ of the planet is covered in water. Set them aside. This remaining ¼ represents total land surface.	Current world grain production a year is 1.85 billion tons.
Step 3 Cut the ¼ into Halves.	One eighth of this land humans cannot live on. Set this 1/8 aside. This remaining 1/8 humans can live on but not necessarily grow food.	Polar regions, deserts, swamps and high and rocky mountains.
Step 4 Cut 1/8 into 4 pieces 4/32	Three of the four pieces represent the land where people can live but not grow food.	Some of this land was never able to grow crops due to location or quality of soil. Some of it was but was developed of destroyed.
Step 5 1/32 and peel the skin	1/32 is the amount of land that we can grow food. The skin represents the topsoil	In U.S., 80% of all cropland lose 1 inch of topsoil every 33 years

Discussion Questions

1. What are some ways that soil is destroyed so that crops cannot grow?
2. What are some measures that can be taken to prevent these destructions?
3. What do you think should happen regarding the growing population and the loss of land to provide food?
4. With the increase need of corn for ethanol will we still be able to meet the food production needs of the world.

Evaluation

1. Ask students if they are witnessing the loss of soil in Southern California. How is that happening?
2. What should people do to stop this loss?

Source

Population Connection. (2003). Teaching population: hands on activities. Washington, DC: Author.

LESSON FIVE
Who Polluted the Santa Ana?

Method
Students will participate in an interactive demonstration on how a river becomes polluted through time. Students will answer questions during and after the demonstration, which will increase their knowledge of how humans have contaminated rivers and how they are responsible to clean them up.

Objectives
1. Students will understand how human populations have changed rivers by polluting them.
2. Students will understand that humans need to be part of solution to this problem.
3. Students will be able to list the pollutants of a river.
4. Students will understand an individual action versus a community action on polluting a river.

5. Students will develop awareness to the changes that occur with population growth and its effect on water resources, develop attitudes of concern for population growth and participate in possible solutions for polluting water resources as described in the Tbilisi Declaration

State Standards
Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

Duration
45 minutes

Setting
Indoor/Outdoor

Materials
1-gallon canister that you can see through (river water)
16 clear plastic cups
Water enough to fill plastic cups halfway

Ingredients for cups (all safe for students)

Dry	**Trees**	Leaves (dry)
	Construction Site	Soil (dry, clayish)
	Person Fishing	Fishing line (or dental floss)
	Farmers	Baking soda
	Gardeners	Baking soda
	Beach Party	Litter, assorted
	Family Picnic	Litter, assorted
Wet	**Barnyard**	Water + Instant coffee
	Washing the Car	Water, soapy
	Antifreeze	Water + 1 drop each blue & green food coloring
	Mystery Liquid	Water + 1 drop red food color
	Septic Tank	Water + 1 drop yellow food color + Toilet paper
	Commuters	Vinegar + Vegetable oil
	Motorboat	Vegetable oil

Procedure

1. Cut out labels and tape to cups and fill with appropriate materials.
2. Fill cups half with water.
3. Give each student a cup and possibly two, until all are evenly distributed.
4. Fill gallon jar with one inch of water.
5. Explain that you are about to tell them a story of the Santa Ana River.
6. When they hear the name of their character they should come up to the canister and dump the contents into the jar. This jar represents the river.
7. Read the following story pausing to ask questions.

Who Polluted the Santa Ana?
Before you begin hold up the canister with one inch of water and ask students the following questions.

Discussion Questions

1. Would you drink this water?
   a. This water represents the water in the Santa Ana 500 years ago.
2. Would you eat fish from this water?
3. Would you swim in this water?

Read to students and have them deposit the contents of their cups into the canister.

For thousands of years Native Americans lived along the Santa Ana River. One of the first explorers to this river kept a journal of what he witnessed. He wrote about the Native American villages, the clear fresh water and the bounty of fish that swam in the Santa Ana. The water tasted so sweet. The air was clean and views spectacular.

With the development of the mission system in California, Mexicans began to explore the area and soon settlements began to form. Mexico awarded land grants to Yorba and Peralta families, which developed the land into the Rancho Santiago de Santa Ana. With this new development came settlers and Vaqueros.

Occasional sever storms would move through this area and **leaves** blew into the river. With the booming population along the Santa Ana River **construction** began on housing, which loosened the soil that washed into the river.

Discussion Questions

1. Is this water safe to drink?
2. Is it safe to swim in or safe for wildlife?

At first the settlements were small. **Farmers** planted crops to feed the settlers. Crops were planted next to the river, which soil and fertilizers would wash into the river. Farmers had other livestock such as pigs, sheep and chickens in their **barnyards**. With rainwater that drained out of the barnyard it carried the manure from these animals into creeks and eventually into the river.

Discussion Questions

1. Would you drink this water now?
2. Is it safe for wildlife?

As the settlements grew they became bigger cities and people began to move away from the cities. People liked the rural living but had to use a septic system, which was not connected to city sewers. One of these homeowners had a broken septic tank and had made no repairs. The raw sewage seeped out and eventually makes it way to the river.

San Bernardino, Riverside and Orange counties are where the Santa Ana River runs through and are the three most populated areas in Southern California. With all of the **commuters** that live in this area car exhaust fumes cause acid rain. If a car is not kept in good repair it will leak oil and other fluids. This is washed away from the roads by rain and eventually will make its way to the river.

Discussion Questions

1. Would you drink this water?
2. Would you eat fish that comes from this river?

As people begin to move into Southern California, they began to landscape and maintain beautiful gardens. These **gardeners** use weed killers and pesticides to maintain the lawns and gardens. The rain will eventually wash away the poisons that will run to the river.

Young adults that change **antifreeze** and oil at home dump these on to the driveway which runs to the sewer and then eventually to the river. **Washing the family car** in the driveway washes the soapy water into the storm drain, which runs to the river.

A family is cleaning out their garage and come across a container with skull and crossbones on it. They do not know what is in the container but decide that it is a **mysterious liquid** and needs disposal. Therefore, to be on the safe side they pour this liquid into the curb, which runs to the storm drain and eventually to the river.

On nice and beautiful days in Southern California people head to the ocean and rivers to enjoy the weather.

A **person fishing** has the fishing line over the side of the boat and the hook catches on a rock. It is pulled and pulled and finally the line breaks. **Motorboats,** which are not maintained, could leak oil into the water. People who picnic on nearby banks having **beach parties** and **picnicking** leave trash. With the next storm or Santa Ana winds, the trash will blow into the river.

Discussion Questions

1. Who polluted the Santa Ana River?
2. Did the growing population have any effect on river?
3. Look at the jar and think about the condition of the river. What could have been done to stop this pollution?
4. How can the river be cleaned-up?
5. How can you stop the pollution of any body of water?

Evaluations

1. Discuss what a watershed is and how it relates to a river.
2. What is the watershed that you live in and what is its current condition?
3. List different programs in your area that are related to cleaning up any river and stream pollution.

Extension

1. Have students research their local waterway and the current conditions of the waterways through their city government.
2. Have students interview their Department of City Planners and discover what restrictions are set for development along rivers or streams in their area.

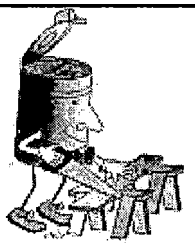
Source

Population Connection. (2003).Teaching population: hands on activities. Washington, DC: Author.

Adapted for Santa Ana River taken from Population Connection, "Who Polluted the Potomac?"

"Who Polluted The Santa Ana River?" Cup Labels

Cut these labels out and tape to clear plastic cups.



Construction Sites

Family Person Fishing

Picnicking

Farmers

Motorboat

Commuters

Washing the Car

Beach Party

Antifreeze

Gardener

Barnyard

Trees

Mysterious Liquid

Homeowner

LESSON SIX
History of a Watershed

Method
Through reviewing of maps, students will be able to determine why changes have occurred in a watershed and the contributions that humans have had on these changes.

Objectives
1. Students will be able to identify how population growth and progress in a watershed can change the contour of land.
2. Students will be able to describe how water runoff is affected by the use of land and how alterations in the runoff can change an environment.

3. Students will be able to develop the knowledge of local watersheds and utilize skills on deciphering the changes that have occurred through years of development while participating in an evaluation of a local watershed and developing attitudes of concern for the pollution of these waterways as described by the Tbilisi Declaration.

State Standards
Ecology

Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

California Geology

9. The geology of California underlies the state's wealth of natural resources as well as its natural hazards. As a basis for understanding this concept:

c. Students know the importance of water to society, the origins of California's fresh water, and the relationship between supply and need.

Duration
45 minutes

Setting
Indoor

Materials

Student page: Watershed Observation, computers, printers, list of websites

Background Information

History has a way of defining current situations and predicting our future. Mapping the growth of an area allows individuals to see patterns that have occurred and how that has changed the present landforms and what the future might hold the next generations. This history would also give insight on the importance of watershed maintenance and preventive measures that can be taken to protect local water.

State and local officials use maps to monitor the uses of land and predict the possible changes that could occur due to runoff into a watershed. Due to the large population growth in Southern California, landforms have been altered that have influenced the watersheds located in this area. Monitoring of residential and commercial building, agriculture, transportation and public land uses is needed to have little or no effect on the watershed.

Changes in landforms can have serious effects on the rivers, stream, lakes and other water sources, which are influenced by soil conditions, vegetation and construction.

Interruption of a watershed also alters wildlife habitats, carbon, water and nitrogen cycles, all which maintain a balanced environment.

Scientist to determine an average measures water flow in a stream over a period. When this seriously changes then water managers will try to determine the reasons for this drastic change. By using maps from the past scientist and water managers can determine the best course of action to protect the water supply to a particular area.

Preparation

Provide the listing of available websites for local watersheds. Copy Watershed Observation sheet for students to complete after they have located necessary maps.

Activity One

Procedure

1. Review with students the background information on watersheds.
2. Students will review list of websites that are listed for research on their local watershed.
3. Once website is located students will then request maps from 100, and 50 years ago of their watershed and print each map.
4. Students will print a current map of the watershed.
5. Students will compare maps and review what changes have taken place through the years.
6. Students will answer the following questions regarding changes on the maps.

Discussion Questions

1. What changes have occurred on your maps?
2. Looking at the map of 100 years ago and the present map what were the greatest changes?
3. Where are most of the humans settled?

Activity Two

Procedure

1. Students will complete Watershed Observation sheet regarding the changes that have occurred through time with their watershed.
2. Students will share answers with the class.

Evaluation

1. Students will compare the different uses for land during the different time periods.
2. Students will describe how runoff has been affected by these changes.

Extension

1. Have students watch local media regarding city planning and how this development will affect the local watershed.
2. Ask students to attending a city-planning meeting regarding development and report on the issues of the local watershed.

Sources

Council for Environmental Education. (2002). Science and civics: Sustaining wildlife. Houston, TX: Author.

Concept of lesson taken adapted from "Color Me a Watershed," Project WILD: Science and civics.

Websites

COUNTY

Riverside County Planning Department
http://www.tlma.co.riverside.ca.us/planning/

Riverside County Multi Species Habitat Conservation Plan
http://www.rcip.org/conservation.htm

Riverside County Parcel Map and APN Locator
http://www3.tlma.co.riverside.ca.us/pa/rclis/index.html

San Bernardino County Planning Department
http://www.sbcounty.gov/landuseservices/

United States Census-San Bernardino County
http://quickfacts.census.gov/qfd/states/06/06071.html

CITY/LOCAL

City of Riverside
http://www.riversideca.gov/

City of Riverside GIS/Census
http://www.riversideca.gov/services-maps.asp

City of San Bernardino
http://www.ci.san-bernardino.ca.us/

City of San Bernardino Parcel Map APN Locator
http://www.ci.san-bernardino.ca.us/WEBSITE/Parcels/

United States Census-City of San Bernardino
http://quickfacts.census.gov/qfd/states/06/0665000.htm

FREE ACCESS TO GIS MAPS, DATA, CENSUS INFORMATION

Google Earth
Free site
Download free software
http://earth.google.com/

TerraServer
http://www.terraserver.com/

Map Quest
http://www.mapquest.com/

ESRI
http://www.esri.com/data/index.html

City of San Bernardino Links to GIS, Census
http://www.ci.san-bernardino.ca.us/depts/infotech/gis___mapping/gis_links.asp#websites

Environmental Organizations

Sierra Club
http://www.sierraclub.org/

The Izaak Walton League of America
http://www.iwla.org/

Friends of the Earth
http://www.foe.org/

Center for Biological Diversity
http://www.biologicaldiversity.org/swcbd/

Ducks Unlimited
http://www.ducks.org/

Earth First!
http://www.earthfirst.org/

Friends of the Northern San Jacinto Valley
http://www.northfriends.org/

California State University/San Bernardino: Nest
http://nest.csusb.edu

Watershed Observations

1. What is the largest contributor to the changes in the watershed?

_____

_____.

2. How do you feel these changes have affected the ecosystem of this watershed?

_____

_____

_____.

3. Has the water runoff been altered?

_____

_____

_____.

4. Has the size, flow or water quality been changed in this watershed?

_____

_____

_____.

5. What preventative measure can be taken in the future to protect this watershed?

_____

_____.

LESSON SEVEN
Habitat, Habitat, Habitat

Method
Students will identify all species (plant and animal) within their work site and determine if survival needs are being met. Through categorizing the species and evaluating the conditions of the habitat, student will rate the habitat for its ability to meet those needs.

Objectives
1) Students will be able to describe characteristic of a site and the species that live within that site.
2) Students will be able to identify the species needs within that site.
3) Students will be able evaluate the needs of the species and if survival is possible.
4) Students will be able to provide possible changes to the site that might improve conditions for a particular species.

5. Students will develop awareness and attitudes of concern for the loss of wildlife habitats, develop knowledge of the structure of a habitat and participate in evaluating this habitat with the necessary skills to provide possible solutions the habitat's survival as described by the Tbilisi Declaration.

State Standards
Ecology
6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:
    a. Students know biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.

Duration
3 60-minute sessions

Setting
Indoor/Outdoor

Materials
Computers, List of websites for maps, Maps of site, Research of species list, Inventory sheets, Quality of Habitat sheets, clipboards, pencils,

Background Information
Inventorying habitats means creating a list of all plants, soil and animal types. This could include a list of just insects or birds that are seen within a certain time period in a particular area. It could also include trees or brushes

for a particular habitat. This would be determined by the purpose of inventory. The first purpose of this inventory is to begin students on the journey to recognize the needs of species within their natural habitat.

An ecosystem, which is healthy, provides the needs of a variety of species. Diversity of species for strengthens an ecosystem where each species fills a niche in support of another. Plants and animals converge in an area where their needs are being met. Plants and animals support one another in an ecosystem. The second purpose of this inventory is to have students recognize what could be done to improve the habitat to meet the needs of the species.

Procedures

Indoor

1. Share with students the background information.
2. Students will form partners to complete lesson.
3. Students will obtain a map of the site that they are inventorying through the use of the computers and suggested websites.
4. Students will research the possible species, which are located in this area using the suggested websites.
5. Students will research the needs of these species for survival. Included in these need categories will be food, light, water, and climate
6. Students will complete research of possible species list before visiting site.

Outdoor

1. Using maps students will survey area for visible signs of species, conditions of soil, pollution factors, water availability, and food supply.
2. Students will complete on inventory species list.
3. Students will next evaluate the ability of the species survival.
4. Students will then complete the Quality of Habitat sheet.
5. Students will answer the following questions in-group discussion:

Discussion Questions

1. Which species did you put on your species list? Which ones did you actually see?
2. Which species do you think is the strongest? Weakest?
3. What environmental issues are affecting this ecosystem?
4. What can be done to save this ecosystem and most of its habitats?

Evaluation

1. Have students look at another site and ask them if they can evaluate the strength of this area for sustainability of its species.
2. Have students look at their list of species and ask if they can speculate about possible species that no longer live in this area. In addition, describe why the species are no longer living in that habitat?
3. Have students take a look at the endangered species list for the State of California and compare this to their species list and comment on any which are on both lists.

Source

Council for Environmental Education. (2002). Science and civics: Sustaining wildlife. Houston, TX: Author.

Concept of lesson was from Project WILD: Science and civics, "How to Evaluate Habitats." Habitat evaluation sheet adapted from original lesson

Student Page
QUALITY OF HABITAT

SPECIES	FOOD	SHELTER	AIR	SPACE	HUMAN CAMPATIBILITY	TOTAL

1. List species in the first column.
2. In columns for food, shelter, water, air, space and human compatibility describe the habitat for that particular species listed. Assess the area using numbers from one to ten, with ten being the highest and one being the lowest.
3. Total your numbers across to give you an indication of the quality of the habitat for each species.

Websites

COUNTY

Riverside County Planning Department
http://www.tlma.co.riverside.ca.us/planning/

Riverside County Multi Species Habitat Conservation Plan
http://www.rcip.org/conservation.htm

Riverside County Parcel Map and APN Locator
http://www3.tlma.co.riverside.ca.us/pa/rclis/index.html

San Bernardino County Planning Department
http://www.sbcounty.gov/landuseservices/

United States Census-San Bernardino County
http://quickfacts.census.gov/qfd/states/06/06071.html

CITY/LOCAL

City of Riverside
http://www.riversideca.gov/

City of Riverside GIS/Census
http://www.riversideca.gov/services-maps.asp

City of San Bernardino
http://www.ci.san-bernardino.ca.us/

City of San Bernardino Parcel Map APN Locator
http://www.ci.san-bernardino.ca.us/WEBSITE/Parcels/

United States Census-City of San Bernardino
http://quickfacts.census.gov/qfd/states/06/0665000.htm

FREE ACCESS TO GIS MAPS, DATA, CENSUS INFORMATION

Google Earth
Free site
Download free software
http://earth.google.com/

TerraServer
http://www.terraserver.com/

MapQuest
http://www.mapquest.com/

ESRI
http://www.esri.com/data/index.html

City of San Bernardino Links to GIS, Census
http://www.ci.san-bernardino.ca.us/depts/infotech/gis___mapping/gis_links.asp#websites

Environmental Organizations

Sierra Club
http://www.sierraclub.org/

The Izaak Walton League of America
http://www.iwla.org/

Friends of the Earth
http://www.foe.org/

Center for Biological Diversity
http://www.biologicaldiversity.org/swcbd/

Ducks Unlimited
http://www.ducks.org/

Earth First!
http://www.earthfirst.org/

Friends of the Northern San Jacinto Valley
http://www.northfriends.org/

California State University/San Bernardino: Nest
http://nest.csusb.edu/

After having tested the lessons in the classroom and in the field, I found that these lessons have been very useful to the corps members and supported by this literature review.

"Brainstorming About the Environment", is a lesson that is directed at creating awareness and knowledge about the issues of the environment and developing an attitude of concern for those problems. Corps members accomplish this by listing the environmental concerns and discussing what are some of the possible solutions. According to the Tbilisi Declaration, awareness is the primary step in an environmental education curriculum. The presentation is easy for students to understand and accomplish its objectives.

"The Importance of Water", is a lesson that is directed at creating awareness and attitudes about connections, that all living creatures have to have water and how all that inhabit the Earth are inter-related. Thomashow believed that this could be the beginning of an individual's ecological identity. This lesson begins that identity for the corps members. The lesson is easy to present to a class and can be done in either the classroom or outdoors.

"How the Natural World Works", is a lesson which provides knowledge about how different natural cycles work and how they affect human life. The Tbilisi Declaration promotes a basic knowledge of natural science to promote a connection to the environment. This lesson has been useful to the corps members as they have a better understanding of why some environmental problems are created by natural causes. This lesson could be more visual for students in the classroom. The use of four small diagrams is sometimes hard to read. Either poster size should be used or a power point presentation.

"How Much Soil Do We Really Need", is a lesson about awareness of soil conservation and the dangers that plague topsoil. Attitude is also a strong component of this lesson because it also deals with world population and possible food shortages. This lesson is very useful to corps members to understand local impact of soil conservation and that it is a global problem. According to Education for Sustainability: An Agenda for Action, students need to realize that this is a global issue and "we are all citizens of one Earth, dependent on common resources and on one another" (National Forum On

Partnership Supporting Education, 1994, p. 60). This lesson is very visual and very powerful.

"Who Polluted the Santa Ana", is a lesson dealing with awareness of water pollution but has students participate in polluting a container of water. This lesson is very visual and students begin to become very aware of the impact that humans can have in the environment. When students participate in a hands-on activity, the lesson becomes more memorable.

"History of Watershed", is a two-part lesson. This lesson is a more advanced lesson for corps members as it requires students to complete research on the computer and create conclusions from the research. Corps members find this information interesting and enjoyed the activity but the lesson needs a field activity. Students not only need to develop the skills in the classroom but also in their "green school".

"Habitat, Habitat, Habitat", is a lesson that develops not only the skills of observation but requires students to participate in groups. Corps members develop this information in the classroom and observe in a natural setting. Corps members are asked to draw conclusion to habitat dangers through their assessment of

an area. The Tbilisi Declaration final objective is to participate in solutions and with this lesson corps member do participate in providing possible solutions for a threatened habitat.

CHAPTER FIVE

IMPLICATIONS FOR EDUCATION

The current condition of education today according to the Educational Testing Service (ETS) is that "one third of those that enter high school do not graduate" (n.d., para. 1) and these students often are disconnected from society. These students find little correlation between their lives and the learning that takes place in a traditional school setting. California Conservation Corps members are young adults who are looking for a fresh start and job skills and hoping to re-connect to life; yet these corps members may also be disconnected from society.

Environmental education is an excellent medium through which these young people can find meaning and success. California Conservation Corps members work within the environment to preserve and maintain natural settings. These natural settings are their "green school" and a place where the reconnection can begin. This process of ownership and exposure through Corps projects can provide a basis for these individuals to understand how they connect to the earth. The activities in this

project are targeted to provide more meaning to California Conservation Corps employment and form a connection to the environment in which members of the corps live.

The lessons provide a sampling of the types of environmental education lessons that are necessary for the California Conservation Corps.

The constructivist approach to learning is the method which best supports the definitions and objectives of environmental education and guidelines for outdoor education. The goal of these educational lessons was to enable corps members to become citizens who are knowledgeable about environment, aware of issues and ways that they can help the environment ultimately, the goal is for them to adopt sustainable lifestyle. Thus, the curriculum builds on students' current knowledge, has activities, which are meaningful, and involves group interactions. This provides lessons that are experiential, investigative and facilitates discussions and observations. These lesson components are the basis for constructivist learning by corps members.

Hungerford and Volk wrote, "the ultimate aim of education is shaping human behavior" (2005, p. 313).

However, the behavior, which is being shaped today, does not often include consideration for the environment and its natural resources. Students need to have a connection to the environment. Educators need to shape that desired behavior, which will give individuals a positive environmental experience. Learning needs to become more meaningful and develop individuals with the passion to sustain earth in all its natural beauty.

An educator's responsibility is to provide education to fit the needs of students. With the high statistics of students' not finishing high school and the environmental issues of today, curriculum must be written to create a new avenue for student interest in the environment. David Orr wrote, "it is not education, but education of a certain kind, that will save us" (2004, p. 8). Thus, there is a vital need for environmental education curriculum to be implemented at all walks of life. With the loss of wildlife habitats and the disconnecting from society, curriculum that reaches students' sense of ownership in the earth and is meaningful is needed to enable them to be responsible environmental citizens. Interest and involvement in the environment is a lifelong

process and one that is vital to everyone's sustainability.

The California Conservation Corps curriculum was created to assist corps members to reconnect to society by taking an interest in the world around them. Through the Tbilisi Declaration's objectives of awareness, attitudes, knowledge, skills and participation, these lessons were developed for corps members to acquire the basics of responsible environmental citizenship. This curriculum guide can be used at any California Conservation Center throughout the state of California.

APPENDIX

CONSENT LETTER

O POPULATION CONNECTION

Education and Action for a Better World March 12, 2007

Barbara K. Cook

1374 Cloud Crest Way San Jacinto, CA 92582

Dear Barbara,

I enjoyed talking with you last week about your interest in using two of Population Connection's activities in a curriculum you are developing for the California Conservation Corps. I am pleased to grant you permission to use the activities, "Earth: The Apple of Our Eye" and "Who Polluted the Potomac?" in this project.

Please use the following credit line for each of these activities:

Reprinted with permission from Population Connection, www.populationconnection.org.

Best of luck with the completion of your graduate work at CSU-SB and give my best to Darleen Stoner.

Sincerely,

Pamela Wasserman

Director of Education

Education Program • www.populationeducation.org • PopEd@popconnect.org
2120 L Street, NW • Suite 500 • Washington DC 20037 PHONE 202.332.2200 / 1.800.POP 1956
• FAX 202.332.2302

REFERENCES

American Forest Foundation. (1995). Project learning tree: Secondary environmental education program: Introductory handbook for the secondary modules. Washington, DC: Author.

American Forest Foundation. (1997). Project learning tree: Municipal solid waste. Washington, DC: Author.

California Conservation Corps. (2006). Retrieved February 10, 2006, from http://www.ccc.ca.gov/

California State Board of Education. (n.d.). Content standards. Retrieved Febuary, 20, 2007, from www.cde.ca.gov/be/st/ss/index.asp

Council for Environmental Education. (2001). Project Wild aquatic. Houston, TX: Author.

Council for Environmental Education. (2002). Project WILD: K-12 curriculum & activity guide. Houston, TX: Author.

Council for Environmental Education. (2002). Science and civics: Sustaining wildlife. Houston, TX: Author.

Crimmel, H. (2003). Teaching in the field: Working with students in the outdoor classroom. Salt Lake City, UT: The University of Utah Press.

Educational Testing Service. (n.d.). ETS Report: One third of those who enter high schools do not graduate. Retrieved February 10, 2006, from http://www.ets.org/portal/site/ets/menuitem.c988ba0e5dd572bada20bc47c3921509/?vgnextoid=63f02d3631df4010Vgn

Epstein, M., & Ryan, T. (2002). Constructivism. Retrieved July, 07, 2006, from http://tiger.towson.edu/users/mepstel/researchpaper.htm

Ford, P., & Blanchard, J. (1985). Leadership and administration of outdoor pursuits. State College, PA: Venture Publishing Inc.

Green School Project. (2002). Retrieved February 26, 2006, from http://www.greenschoolproject.com/about_us.htm

Hungerford, H., & Volk, T. (2005). Changing learner behavior through environmental education. In H. R. Hungerford, W. J. Bluhm, T. L. Volk, & J. M. Ramsey (Eds.), Essential readings in environmental education (pp. 313-323). Champaign, IL: Stipes Published L.L.C.

Klein, E. & Merritt, E. (1994). Environmental education as a model for constructive teaching. Journal of Environmental Education, 25 (3), 14-21.

Knapp, C. (1992a). Lasting lessons: A teacher's guide to reflecting on experience. Charleston, WV: ERIC.

Knapp, C. (1992b). Thinking in outdoor inquiry. Retrieved February 20, 2007, from http://www.ericdigest.org/1992-2/outdoor.htm

Knapp, D. (2005). Environmental education and environmental interpretation: Relationships. In H. R. Hungerford, W. J. Bluhm, T. L. Volk, & J. M. Ramsey (Eds.), Essential readings in environmental education (pp. 349-356). Champaign, IL: Stipes Published L.L.C.

National Forum on Partnerships Supporting Education. (1994) Education for sustainability: An agenda for action. Washington DC: US Government Printing Office.

Orr, D. W. (1994). Earth in mind: On education, the environment, and the human prospect. Washington, DC: Island Press.

Population Connection. (2003). Teaching Population: Hands on activities. Washington, DC: Author.

Sobel, D. (2005). Place-based education: Connecting classrooms and communities. Great Barrington, MA: The Orion Society.

Stapp, W. et al. (2005). The concept of environmental education. In H. R. Hungerford, W. J. Bluhm, T. L. Volk, & J. M. Ramsey (Eds.), Essential readings in environmental education (pp. 33-36).Champaign, IL: Stipes Published L.L.C.

Tbilisi Declaration, The. (2005). In H. R. Hungerford, W. J. Bluhm, T. L. Volk, & J. M. Ramsey (Eds.), Essential readings in environmental education (pp. 13-16). Chicago, IL: Stipes Published L.L.C.

Thanasoulas, D. (n.d.). Constructivist learning. Retrieved July 07, 2006, from http://www.seasite.niu.edu/Tagalog/teachers_Page/Language_Learning_Articles/constru...

The Watercourse and the Council for Environmental Education. (2003). Project WET: K-12 curriculum & activity guide. Bozeman, MT: Authors.

Thomashow, M. (1995). Ecological identity: Becoming a reflective environmentalist. Cambridge, MA: Massachusetts Institute of Technology.