Integrating environmental education into the curriculum through environmental community service learning

Jay Allen Westover

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INTEGRATING ENVIRONMENTAL EDUCATION INTO THE CURRICULUM
THROUGH ENVIRONMENTAL COMMUNITY SERVICE LEARNING

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Masters of Arts
in
Education:
Environmental Education

by
Jay Allen Westover
June 2001
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Approved by:

Dr. Darleen Stoner, First Reader

Dr. Gary Negin, Second Reader
ABSTRACT

The goal of environmental education is to increase individuals' ecological knowledge, awareness of associated environmental problems, and motivation to evaluate and implement solutions. This project combined the concepts of environmental education with community service learning to create a new method of curriculum integration; environmental community service learning. The California State standards for environmental education, service learning, language arts, mathematics, science, and social studies were integrated into four thematic units using the teaching methodologies of cooperative learning, authentic assessment, and reflection. The integrated, thematic units of this project could be used by educators in a multi-disciplinary, team teaching scenario or in a single classroom setting as either sequential, thematic units of study or independent activities.
ACKNOWLEDGMENTS

Special thanks is given to Dr. Darleen Stoner for her years of dedication to the field of environmental education and guidance and support for this project.
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DEDICATION

To Mackenzie Shay Westover
CHAPTER ONE

INTRODUCTION

"Environmental education 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 solution" (Stapp, et. al., 1969, p. 23). This definition of environmental education has not changed significantly during the past 30 years; however, the education system in the United States has not promoted this definition into becoming a reality. In fact, the environmental knowledge possessed by the public is minimal even though environmental education has been publicized (Gigliotti, 1990). Gigliotti proposed that environmental education has created citizens who lack ecological foundations, but are willing to fight for ecological myths without knowing their own role in environmental problems. Gigliotti's findings may be connected to the fact that people are disconnected from most environmental problems; therefore, their concern is without actual appreciation, sensitivity or firsthand knowledge of the issues in contention.
For this reason, it is proposed that community service learning may provide a way for students to increase their environmental literacy because of the interest and excitement generated by applying environmental knowledge to the local community. Through environmental community service learning (ECSL), students apply knowledge and skills learned in class to outdoor activities designed to enhance their own community. This practical application of learned skills connects community service learning to environmental education through the infusion of ecological foundations, environmental interactions, and environmental issues. The end result provides students with real-life, hands-on experiential learning that empowers them to take action.

Previous research has concluded that community service learning increases student responsibility, improves social attitudes, promotes exploration of careers, enhances self-esteem and morals, and develops complex thought patterns and mastery of skills and content (Conrad & Hedin, 1991). Both community service learning and environmental education use the constructivist learning strategy in conjunction with cooperative
learning, interdisciplinary teaching, outdoor experiences, performance assessment, and reflection to achieve values clarification, citizenship skills, student ownership and empowerment, and relevant learning.

Students are motivated when they connect education to real-life experiences. In ECSL, students and teachers can jointly explore their community to discover ecological connections, environmental issues, and community concerns. The environmental education components of ecological literacy, environmental sensitivity, issues analysis, citizenship, and internal locus of control are connected to the California curriculum content standards in an interdisciplinary format. Through a constructivist approach, students discover a problem, attain relevant knowledge, establish their own values and feelings, create and assess the validity of solutions, and actively participate toward a resolution. ECSL allows for students to reflect on their progress and feelings in order to develop a value system. Various forms of assessment are utilized including teacher observation of student work, journal writing by students, and performance-based assessment.
CHAPTER TWO

REVIEW OF THE LITERATURE

To support the development of environmental community service learning, literature from the areas of environmental education, community service learning, curriculum integration, and teaching methodologies was researched.

Environmental Education

As stated by Stapp, et. al. (1969), the goal of environmental education is to produce citizens knowledgeable of the environment and respective problems, aware of how to solve these problems, and motivated to work towards their resolution. Roth (1996) stated that people must progress through a hierarchy of steps to achieve this goal. First, they acquire awareness of the consequences of the interactions between humans and nature. Second, they develop a sense of concern that change needs to occur for the prevention of negative environmental consequences. Third, they understand the detailed information regarding historical and future implications of human and nature interactions through thinking and decision-making skills. Lastly, they apply
their understandings through responsible behavior which decreases negative environmental consequences. Similar to Roth, the authors Hungerford, Peyton, and Wilke (1980) explained that environmental education for students is based upon sequential goals which start with an ecological foundation with respect to environmental issues. The next step is conceptual awareness of how individual actions, which can be changed, influence the quality of the environment. The next level is investigation of environmental issues and evaluation of alternative solutions. The final level is the acquisition of skills necessary for taking positive environmental action towards a dynamic equilibrium between quality of life and the environment. The objectives associated with these goals help individuals in the following ways: (1) acquire an awareness and sensitivity to the total environment and its allied problems; (2) gain a variety of experiences in, and acquire a basic understanding of, the environment and its associated problems; (3) acquire a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection; (4) acquire skills for identifying and solving environmental problems; and (5) provide an opportunity to
be actively involved at all levels in working toward resolution of environmental problems (Hungerford, et al., 1980).

Stapp, et al. (1969) concluded that in order to meet the goals of environmental education, people must understand that the quality of life is dependent upon proper stewardship of resources, and therefore, environmental education must educate people about their interrelationship with the total environment. The public must realize that they are not separate from the environment and each individual is responsible for resource depletion and pollution (Gigliotti, 1990). Environmental education must provide a basic understanding of ecological foundations, make the connection between individual actions and degradation of the environment, and afford credible actions which individuals can partake in to remedy environmental concerns (Gigliotti, 1990).

Hungerford and Volk (1990) concluded that maximized environmental behavior would occur if ecological concepts and relationships were taught, in-depth opportunities to develop environmental sensitivity and knowledge of issues were provided, application of issue analysis and investigation and citizenship skills were afforded, and an
internal locus of control was developed. Students need to feel a sense of empowerment to become environmentally sensitive citizens whose actions are oriented towards positive environmental change. Thus, environmental education curriculum should develop individual value systems connected to the environment that foster the purification, improvement, and maintenance of ecosystems (Knapp, 1983).

Environmental education is based on the constructivist philosophy that students attain knowledge by constructing their own concepts, thereby, promoting change in values and behavior. Ballantyne and Packer (1996) stated that constructivism allows students to learn about the environment by exploring various concepts, challenging aspects of environmental knowledge, values, and behavior, and committing to a decision based on their own environmental understanding, attitudes, and behavior. Students can acquire necessary understanding and skills within this constructivist schema through cooperative learning, journal writing, and story telling. In addition, environmental education is similar to community service learning in that it provides real-life situations for students to act on personal values, develop
interpersonal skills, and problem solve (Knapp, 1983). Students are presented with moral dilemma problems, outdoor experiences, and role-playing situations.

Community Service Learning

Conrad and Hedin (1991) noted that reforms promoting community service learning occurred during the 1930s, 1950s, 1970s, and 1990s. Arguments for these reform measures included meeting community needs by decreasing separation of young people from the life of the community through involvement in a wide range of real and meaningful tasks. This separation could be decreased by stimulating academic and social development through actions directed toward the welfare of others and creating opportunities for non-college-bound students. The goal of the reform measures was to promote students' personal, social, and intellectual development while preparing them to become involved and effective citizens (Conrad & Hedin, 1991). A study conducted by Conrad and Hedin found that students who participated in community service learning programs increased their problem solving skills, became more open-minded to issues, were better able to think critically, gained social and personal responsibility, improved upon communication skills, and increased their self-esteem.
Calabrese and Schumer (1986) suggested that service learning activities reduced student alienation, improved school behavior and grade point averages, increased acceptance by the community, and promoted success of females through collaborative problem solving. Through community service learning students learn by doing, shape their own behavior, relate to others, and become socially responsible adults (Anderson, Kinsley, Negroni, & Price, 1991). In addition, students learn how to conduct research, think, write, public speak, problem solve, and make a difference in their community (Nathan & Kielsmeier, 1991).

Effective community service learning programs should focus on active learning through interdisciplinary team experiences (Anderson, et al., 1991). The most effective programs are integrated into the entire school curriculum. Successful programs accomplish measurable and necessary service, involve students in the planning and implementation process, establish clear student outcomes, provide for active reflection, and recognize student participation (Nathan & Kielsmeier, 1991).

Implementation of programs should follow the steps of establishing a community service learning theme,
determining objectives, meeting with the community, creating activities, developing learning experiences, establishing a time line, reflecting, and celebrating success (Anderson, et al., 1991). Community service learning can be integrated into the curriculum or established as a culminating activity to a unit of study.

Nathan and Kielsmeier (1991, p. 739) stated that, “Combining classroom work and community service learning projects can help produce dramatic improvements in student attitudes, motivation, and achievement.”

Curriculum Integration

The environmental education curriculum should not be treated as episodes in certain courses, rather it should be infused into the existing school curriculum via an interdisciplinary approach using team teaching (Ramsey, Hungerford, & Volk, 1992). The idea of integrated curriculum began in the 1800s, resurfaced in educational reform movements in the early 1900s, and has been a focus of study ever since (Vars, 1991). Interest in curriculum integration can be connected to the need to teach increasing quantities of content material while maintaining student motivation and participation (Brandt, 1991). Since 1942, more than 80 normative or comparative
studies on curriculum integration have been conducted with nearly all indicating that students taught in an integrated curriculum program do as well or better on standardized achievement tests compared to traditionally taught students (Vars, 1991).

Several models for the integration of academic disciplines have been developed including fragmented, connected, nested, sequenced, shared, webbed, and integrated models (Fogarty, 1991). The fragmented model organizes the curriculum into the traditional disciplines of science, math, language arts, and social studies. This model allows teachers to prioritize content material. The connected model references an intrinsic idea in each discipline to create an organizer for students. The nested model targets a skill nested within a unit or discipline. The sequenced model arranges related topics amongst disciplines so that they coincide. The shared model focuses on overlapping concepts within disciplines in order to point out commonalities to students. The webbed model uses a relevant theme to connect disciplines. The threaded model focuses on thinking skills, social skills, study skills, and multiple intelligences as a means to connect disciplines. The
integrated model is a cross-curricular approach that uses interdisciplinary topics arranged around overlapping concepts to blend skills, concepts, and attitudes amongst disciplines.

The development of integrated units focusing on a local issue has proven to be very successful (Williams & Reynolds, 1993). Teachers pull away from their compartmentalized disciplines to create units based on the needs of the students. Williams and Reynolds suggested that successful interdisciplinary units are relevant, provoke student interest, and encourage participation.

Jacobs (1991) stated that an interdisciplinary curriculum plan should be developed over a three year period. Curriculum development begins with studying existing monthly units, aligning disciplines, eliminating repetition, identifying interdisciplinary units, infusing performance-based assessments, and agreeing on the best curriculum model (Jacobs, 1991). A two to six week pilot unit of study is then created in which evaluation procedures, budgets, time lines, and teacher responsibilities are specified. During the second year the pilot unit is implemented and evaluated for success and necessary changes. Depending upon the success of the
pilot unit, the program is revised and adopted into the curriculum the third year.

Teaching Methodologies

Constructivist methods of instruction have been found to parallel the teaching strategies employed by environmental educators (Klein & Merritt, 1994). Research has shown that students in constructivist-oriented, freshman-level, college environmental science classes for nonmajors expressed increased enjoyment and participation, were better at interpreting, analyzing, and critical thinking, and received better grades on tests than traditionally taught students (Lord, 1999). Brooks (1990) stated that constructivism is powerful because it allows students to use their creative, intellectual abilities to solve real problems and expand their knowledge and skills. Teachers using constructivist practices should use raw data, primary sources, and cognitive terminology, allow student thinking to drive lessons, engage students in dialogue, encourage student inquiry, facilitate student reflection, and design curriculum around conceptual clusters (Brooks, 1990). Successful constructivist lessons use student-centered instruction, group
interaction, and authentic assessment to solve a real problem (Klein & Merritt, 1994).

The authentic assessment component of constructivism can be traced back to the educational theories of John Dewey who believed that thinking and action needed to take place simultaneously (Stapp & Wals, 1994). Authentic assessment allows students to construct meaning and knowledge through inquiry for the production of valuable and meaningful outcomes (Newmann & Wehlage, 1993). Effective authentic assessments utilize higher-order thinking, depth of knowledge, meaning and value beyond the classroom, substantive conversation, and social support for student achievement (Newmann & Wehlage, 1993). In order to solve real-life, relevant problems, students assess what they know, identify what they need to know, gather information, and work collaboratively to evaluate hypotheses (Stepien & Gallagher, 1993). Motivation in students is increased because they assume a role in solving a real problem. Stepien and Gallagher (1993, p. 26) stated that "problem-based learning is apprenticeship for real-life problem solving."
CHAPTER THREE

STATEMENT OF GOALS
AND OBJECTIVES

The goal of this project was to provide educators with a usable framework and curriculum for facilitating environmental education for high school students through community service learning activities. This curriculum could increase students' ecological foundations, environmental awareness and sensitivity, environmental issues analysis skills, and ability to take action towards environmental issues.

The goal was achieved through the development of four interdisciplinary, thematic units connecting environmental education and community service learning. Topics covered included: designing a lake resort to enhance ecological knowledge and environmental awareness and sensitivity; analyzing the environmental problems associated with the development of the lake resort and of a local environmental issue to improve environmental issues analysis skills; and taking part in a community service learning project to increase awareness of how to take action towards solving an environmental issue.
CHAPTER FOUR
DESIGN OF THE PROJECT

The project consists of four thematic units. The first unit consists of an activity in which students develop a rural lake into a commercial resort area. Students learn the ecology of native flora and fauna to make decisions regarding environmental and human needs. The second unit explores environmental issues associated with the development of the rural lake into a resort. Students review an in-depth summary of the environmental problems, associated players, and respective beliefs and values to decide the best solution to the environmental issue. The third unit requires students to explore their own community for a local environmental issue to research. Students obtain a greater understanding of the environmental issue by determining all players and their respective beliefs and values, which in turn is used to create probable solutions. In the fourth unit, students choose one of the local environmental issues from Unit Three to work collaboratively on a community service learning project in order to achieve a possible solution.
Each unit is coordinated with the California State Standards of English, Mathematics, Science, and Social Studies. In addition, major concepts associated with environmental education and community service learning are referenced in each unit.
CHAPTER FIVE

RESULTS AND DISCUSSION

Each of the four units of this project were field tested in a high school environmental science class. Trials of each unit were completed by students as independent activities, rather than sequential, thematic units. Student groups effectively completed Units One, Two, and Three with little variation from the design of the project. Students evaluated and improved an existing, campus-wide recycling program as an environmental community service learning activity for Unit Four.
CHAPTER SIX

IMPLICATIONS FOR EDUCATORS

The project was designed to fit into the high school curriculum of language arts, mathematics, science, and social studies, although it could be adapted to other grade levels. The interdisciplinary, thematic units could be utilized by educators in a team teaching scenario or in a single classroom setting as either a sequential, thematic unit of study or, with some variation to the project design, as independent activities.

The activities within this project were designed to facilitate environmental education by allowing students to make associations with their own community through relevant, authentic learning experiences. The flexibility inherent to this project would provide educators with various methods of integrating environmental education into the curriculum.
APPENDIX

PROJECT DESIGN
Unit One: Designing Forest Lake Resort

Lesson Summary

Students learn the effects on the environment of land uses by designing a resort development in a previously undisturbed, natural setting.

Goal

To introduce students to ecological concepts, environmental sensitivity, and human interactions within a community.

Duration

Five periods (50 minutes each) or longer, depending upon the length of time spent on the pre-activity, report writing, and presenting.

Learning Objectives and Standards

1. Environmental Education: Understand interactions and interdependence of species; the effects of humans as members of ecosystems; and the implications of human activities and communities. Increase environmental sensitivity and appreciation.

2. Community Service Learning: Understand and identify the needs of the human community.
3. Language Arts: Write a technical report regarding human impacts on the environment, and orally present the findings.

4. Mathematics: Find areas of attributes and use conversion factors to scale attributes on a map.

5. Science: Understand ecological interactions.

6. Social Studies: Evaluate ecological and human needs to construct a written and oral presentation.

List of Materials

1. Newspaper articles of local environmental issues.

2. Copies of Forest Lake Resort Development, the Forest Lake map, and map key for each student.

3. A ruler and box of colored pencils for each student group.

Preparation for Lesson

1. As a pre-activity, students should be guided through a local newspaper to find and evaluate articles involving environmental issues. Students should continue to collect newspaper articles of environmental issues occurring in the community.
2. Assign teams of 2 or 3 students to design the resort. These teams can be divided randomly, academically, or by student choice.

3. Each student should receive a copy of the Forest Lake Resort Development, the Forest Lake map and map key.

4. Each student group should receive a ruler and colored pencils for labeling attributes on the map.

5. Instruct students on how to use the ruler to determine the scale of attributes. The map scale is 1 inch equals 1 mile. Using the ruler, have students draw a 1 square inch box. This box equals 1 square mile. Students should understand that 1 square mile, a 1 square inch box, equals 640 acres. Students should divide the box into fourths, each quarter equaling 160 acres. Students should then divide each quarter into fourths which will result in 40 acre parcels. Attributes on the map are to be measured in acres.

6. Decide how colors are to be assigned for each attribute on the map. A standard color template may be chosen for the purpose of teacher evaluation.

7. Introduce students to the lesson. Be sure to explain each attribute of the resort. Students may have
questions at this time regarding the design of the resort. Make sure that all decisions are made by the group of students.

8. Upon completion of the map and report, student groups should present their proposals for the resort. Allow for a brief question and answer period to clarify the presentation.

9. After all groups have presented, the teacher should facilitate a brief class discussion regarding the pros and cons of the resort, environmental impacts on each species, and anticipated health of the ecosystem if the resort is to be built.

10. Following the discussion period, each student should reflect upon the discussion session and the decisions they made to create their own proposal. In retrospect, students should decide if any attributes of their proposal would be different. Rationale for each change should be provided.
Forest Lake is located in an isolated region within a unique biogeographic area consisting of mountains, coniferous and oak forests, meadows, marshes, and riparian vegetation zones. Developers of the resort have been granted preliminary rights to commercially develop the area under the condition that preserves are established for each of the five rare animals residing in the region.

These rare animals include the woodland fox, marsh mouse, pine owl, meadow weasel and forest lake toad. The woodland fox lives in the oak forest, and hunts the marsh mouse and forest lake toad in the meadow and riparian zone. The marsh mouse uses thickets in the marsh for protection. Seeds and fruit from vegetation found in the meadow and riparian zone is the main food source of the marsh mouse. The pine owl uses the lake pine tree for nesting. The pine owl hunts the marsh mouse and forest lake toad in the meadow and riparian zone. The meadow weasel lives in tunnels found in the meadow, and hunts meadow mice in the meadow and riparian zone. During the spring, the meadow weasel forages on the eggs of water fowl found along the shoreline of Forest Lake. Forest
Lake toads lay eggs in Forest Lake. The forest lake toad seasonally migrates back and forth between the oak forest and Forest Lake.

Rather than many small preserves for each species, single, large preserves are preferred. Large preserves allow for the growth of populations necessary to maintain genetic equilibrium and population dynamics. Genetic equilibrium of a population is maintained when a sufficient number of individuals produce offspring, thus preventing inbreeding and creating genetic diversity in individuals. Population dynamics is dependent upon the availability of sufficient habitat for food, shelter, mating, and raising young.

The resort complex is to have the least impact on the environment while meeting the needs of resort visitors. The developers must designate the areas to be used for the preserves, camping areas, condominiums, retail stores, marina, main resort, medical facility, airport, power plant, municipal and toxic waste storage sites, sewage treatment plant, water wells and roads. Locations of the airport, power plant, municipal and toxic waste sites, sewage treatment plant and water well are of particular
concern. Attributes of the resort must be located on the regional map encompassing 24,640 acres.

A two page report must accompany the resort map explaining the rationale for the placement of each attribute and the anticipated impacts on the regional ecosystem, five rare animal species and water resources.
## MAP KEY

<table>
<thead>
<tr>
<th>USE</th>
<th>LAND NEEDED</th>
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<tr>
<td><strong>COLOR/SYMBOL</strong></td>
<td></td>
</tr>
<tr>
<td>Woodland fox preserve</td>
<td>640 acres</td>
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<tr>
<td>Marsh mouse preserve</td>
<td>640 acres</td>
</tr>
<tr>
<td>Pine owl preserve</td>
<td>640 acres</td>
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<tr>
<td>Meadow weasel preserve</td>
<td>640 acres</td>
</tr>
<tr>
<td>Forest lake toad preserve</td>
<td>640 acres</td>
</tr>
<tr>
<td>Camping areas (3 needed)</td>
<td>1,920 acres</td>
</tr>
<tr>
<td>Condominiums</td>
<td>640 acres</td>
</tr>
<tr>
<td>Retail stores</td>
<td>640 acres</td>
</tr>
<tr>
<td>Main resort</td>
<td>640 acres</td>
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<tr>
<td>Marina</td>
<td>320 acres</td>
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<tr>
<td>Roads and parking</td>
<td>640 acres</td>
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<tr>
<td>Airport</td>
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<td>Power plant</td>
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<td>Municipal waste dump</td>
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<td>Toxic waste dump</td>
<td>40 acres</td>
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<td>Sewage treatment plant</td>
<td>40 acres</td>
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<td>Water well</td>
<td>40 acres</td>
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<td>Medical facilities</td>
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### Habitat Types

- Mountains
- Oak forest
- Coniferous forest
- Meadow
- Marsh
- Riparian vegetation
- Lake
Lesson Summary

Students acquire a conceptual awareness of environmental issues and values by evaluating the positions, beliefs and values of people and organizations involved with an environmental problem.

Goal

To introduce students to the analysis of environmental issues through values clarification.

Duration

Four periods (50 minutes each) or longer, depending upon the length of time spent on the pre-activity and presentation.

Learning Objectives and Standards

1. Environmental Education: Increase awareness, understanding, and skills of environmental issues analysis.

2. Community Service Learning: Determine solutions to an environmental issue through identification of community needs.

3. Language Arts: Compose and orally present solutions to an environmental issue.
4. Mathematics: Calculate changes in populations and compare percentages.

5. Science: Understand ecological interactions.

6. Social Studies: Evaluate the positions, beliefs and values associated with an environmental issue.

List of Materials

1. Copies of Forest Lake Resort Environmental Issue and Student Worksheet - Environmental Issues Analysis for each student.

2. Newspaper articles of local environmental issues.

Preparation for Lesson

1. As a pre-activity, students should be exposed to the issue of school dress codes. Students should brainstorm the players involved with the issue, along with their positions, beliefs, and underlying values. Possible ideas for the brainstorming activity include the following. Teachers are in favor of the dress code because they believe it would reduce student alienation based on a social value. Parents are in favor of the dress code because they believe it would reduce the cost of school clothes based on an economic value. Students are against the dress code because they believe it is
against their freedom of expression based on a legal value.

2. Students should receive a copy of the Forest Lake Resort Environmental Issues Analysis and Student Worksheet - Environmental Issues Analysis.

3. Assign teams of 2 or 3 students to evaluate the environmental issue. These teams can be divided randomly, academically, or by student choice.

4. Students may either read the handout independently or as a class. The teacher may want to facilitate a brief question and answer session to insure that all students understand the Forest Lake environmental issue.

5. Students should use the worksheet to summarize the position, belief and value of each player. Each player may have several positions, beliefs, and underlying values. The Answer Sheet - Environmental Issues Analysis summarizes possible answers, although students' answers may vary.

6. Students should then work as a group to determine plausible solutions to the environmental issue. Solutions should be based on a critical evaluation of the positions,
beliefs, and values associated with the environmental issue.

7. Upon completion, student groups should present their findings and solutions. Allow for a brief question and answer period to clarify the presentation.

8. After all groups have presented, the teacher should facilitate a brief class discussion regarding the pros and cons of Forest Lake resort. Be sure to discuss the design of the resort in Unit One. Following the discussion, students should reflect on their beliefs which led to the placement of each attribute on the map in Unit One. In addition, they should reflect upon the value associated with each of their beliefs.

9. Following the discussion period, each student should review their newspaper articles (collected in Unit One). Articles should be separated based on the extent to which players, positions, beliefs, and values can be obtained. This information will be used in later activities. Students should continue to collect newspaper articles of local environmental issues.
FOREST LAKE RESORT ENVIRONMENTAL ISSUES ANALYSIS

Forest Lake is located in an isolated, 38.5 square mile region within a unique biogeographic area consisting of mountains, coniferous and oak forests, meadows, marshes, and riparian vegetation zones. The United States Fish and Wildlife Service (USFWS) determined that five rare animal species inhabit the region including the woodland fox, marsh mouse, pine owl, meadow weasel and forest lake toad. This determination was based on the unique habitat needs and population levels of each species. The woodland fox requires a habitat combination of oak forests, meadows and riparian zones. Woodland fox population levels were estimated in this region at 100, 94, and 86 in 1994, 1996, and 1998, respectively. The marsh mouse also requires a unique habitat setting including marshes, meadows, and riparian zones. Marsh mouse population levels were estimated in this region at 1,000, 990, and 886 in 1995, 1997, and 1999, respectively. The pine owl nests only in dead coniferous snags in the forests bordering Forest Lake, and forages in meadows and riparian zones. Pine owl population levels were estimated in this region at 60, 56, and 50 in 1994, 1996, and 1998,
respectively. The meadow weasel requires meadows and riparian zones for habitat. Meadow weasel populations were estimated in this region at 90, 83, and 76 in 1993, 1996, and 1998, respectively. The forest lake toad is found only within proximity of Forest Lake and requires both lake and oak forest habitat. Forest lake toad populations were estimated in this region at 600, 566, and 540 in 1996, 1998, and 1999, respectively. Decreasing population levels are assumed to be a result of logging, mining and recreation activities in the region. The USFWS oversees the health and well-being of these rare species, and would be responsible for the approval of any preserves designated for the conservation of these species.

The Forest Lake ecosystem is located approximately 50 miles from a densely populated suburban region. Forest Lake County encompasses both forest lake and the suburban region. The County has seen tremendous population growth over the last 8 years. The Board of County Supervisors (Board), who oversees land use developments within the County, anticipates future water resource problems as a result of this population explosion. The Board has considered three potential uses for Forest Lake including
a municipal water source, county park, and private resort development. The County currently uses water wells for the purveyance of municipal water to residences; however, it is projected that groundwater reserves may not be sufficient for long-term use. The Board is considering excluding any use of Forest Lake so as to preserve the integrity of the water for a potable water source. The Board also sees the need for access to local recreation in order to continue the growth of the suburban region. Designating Forest Lake as a county park would provide the Board with a means of conserving the resources of Forest Lake while allowing for recreation. However, the Board realizes that the recreational activities associated with a county park would not have the same attraction as a resort complex. A private resort development would provide a wide array of recreational activities for the growing suburban region. The Board is concerned that the resort could have negative effects on the health of the ecosystem and purity of Forest Lake. Measures would have to be taken to preserve Forest Lake resources while allowing for recreational activities.
The USFWS has granted developers preliminary rights to commercially develop the area under the condition that preserves are established for each of the five rare animals residing in the region. The resort complex is to have the least impact on the environment while meeting the needs of resort visitors. In order to preserve the integrity of the ecosystem and purity of Forest Lake, the developers must designate the areas to be used for the preserves, camping areas, condominiums, retail stores, marina, main resort, medical facility, airport, power plant, municipal and toxic waste storage sites, sewage treatment plant, water wells and roads. Resort developers agree that the establishment of a resort complex should both preserve the environment and provide recreational activities for visitors. However, resort developers don't want visitors' accessibility to recreational pursuits limited due to restrictions on the use of Forest Lake and the surrounding region. Resort developers are in agreement that preservation and conservation is necessary, but not at the cost of recreational activities and future expansion of the resort.
The Committee for the Preservation of Forest Lake Ecosystem (Committee), a local environmental group, is against the development of Forest Lake. The Committee does support the idea of designating the region as a county park, as limited use restrictions will prevent overuse of the region. Many members of the Committee have lived in the region prior to the suburban boom, and see Forest Lake as a lasting image of the region prior to population growth. The creation of a resort complex would commercialize a region known for its aesthetic beauty, wildlife, and unique attributes. The Committee also believes that although the USFWS requires preserves for rare species and the Board wants to preserve the integrity of Forest Lake, the impact of high volume recreation will be detrimental to animal populations and water quality of the region.

As a result of on-going Board meetings, a citizens group promoting the use of Forest Lake as a resort has formed. Most of the members of the citizens group have lived in the region for 5 years or less and commute to the city for work. The suburban region has very few recreational outlets to accommodate the citizen group's
desire for weekend recreational activities. The citizens group has conducted surveys of residents in Forest Lake County. Of those responding, 38% approve of the resort, 42% oppose the resort and 20% are indifferent to the development of Forest Lake resort. The citizens group contends that once the residents see the benefits of a recreational outlet, the majority of the 20% who are indifferent will be in favor of the resort.

Local fishermen view the feeder stream of Forest Lake as a preferred fishing spot. Trout inhabiting the stream spawn in Forest Lake and then swim up the stream where they reside until the following spawn. The fishermen fear that the use of Forest Lake for recreational activities will interfere with the spawning of trout. This could potentially have a devastating effect on the future population of trout in the stream. Local fishermen see Forest Lake resort as an encroachment upon a region that has provided family fishing experiences for decades. They do not want this stream or the trout to be exploited.

Forest Lake is the only body of water in Forest Lake County that could potentially be used for water recreation. Residents who tow their boats to neighboring
counties see Forest Lake resort as a means to reduce their travel time. A resort complex would allow them to use either rustic or plush accommodations for extended boating outings. Most residents currently go on day trips, since waterfront accommodations are not available at lakes in adjoining counties.

During Board meetings it has become apparent that the decision to allow or not allow the development of Forest Lake resort is a complex issue due to conflicting environmental and social beliefs. A final decision cannot be made until all persons involved understand the contentions held by each; and come to an agreed upon compromise. This will require that the beliefs and values associated with all positions regarding Forest Lake resort are understood and evaluated.
STUDENT WORKSHEET - ENVIRONMENTAL ISSUES ANALYSIS

1. Player:
   Position:
   Belief:
   Values:

2. Player:
   Position:
   Belief:
   Values:

3. Player:
   Position:
   Belief:
   Values:

4. Player:
   Position:
   Belief:
   Values:

5. Player:
   Position:
   Belief:
   Values:
6. Player:
   Position:
   Belief:
   Values:

7. Player:
   Position:
   Belief:
   Values:

Solutions:

1.

2.

3.

4.
ANSWER SHEET - ENVIRONMENTAL ISSUES ANALYSIS

1. **Player:** United States Fish and Wildlife Service
   **Position:** Forest Lake resort can be built only under the condition that rare species inhabiting the region can be protected.
   **Belief:** Preserves should be established for the five rare animal species in order to stabilize population levels.
   **Values:** legal, ecological, and environmental

2. **Player:** Lake Forest County Board of Supervisors
   **Position:** Forest Lake resort can be built only under the condition that water resources in the region are protected.
   **Belief:** Measures should be taken to protect the integrity of Forest Lake for future use as a potable water source.
   **Values:** social, economic, environmental

3. **Player:** Developers of Forest Lake resort
   **Position:** Forest Lake resort should be built.
   **Belief:** Areas within the resort complex could be used for the preservation of rare animal species and water resources. Visitors access to recreation and expansion of the resort should not be hindered due to preservation efforts.
   **Values:** economic, environmental, recreational
4. **Player:** Committee for the Preservation of Forest Lake Ecosystem

   **Position:** Forest Lake resort should not be built.

   **Belief:** Forest Lake resort would have a negative impact on rare animal species and water resources regardless of any preservation or conservation measures.

   **Values:** environmental, aesthetic, ecological

5. **Player:** Citizens group in favor of Forest Lake resort

   **Position:** Forest Lake resort should be built.

   **Belief:** Forest Lake resort would provide a growing suburban population access to local recreational activities.

   **Values:** social, recreational

6. **Player:** Local fishermen

   **Position:** Forest Lake resort should not be built.

   **Belief:** Visitors of Forest Lake resort would exploit traditional fishing of trout in the feeder stream of Forest Lake. Boating in Forest Lake could disrupt trout spawning and possibly reduce future trout populations.

   **Values:** social, ecological, environmental

7. **Player:** Boaters

   **Position:** Forest Lake resort should be built.

   **Belief:** Forest Lake resort would provide a local body of water for boating and overnight accommodations.

   **Values:** economic, recreational
Solutions: Solutions will vary. Possible solutions to the environmental issue are listed below.

1. Forest Lake resort can be built if resort visitors have limited access to Forest Lake and preserves are created for rare animal species.

2. Forest Lake resort can be built on the condition that the annual number of visitors is regulated by the USFWS and Lake Forest Board of Supervisors in an effort to reduce environmental impacts.

3. Forest Lake region can become a county park, which will provide limited recreational activities to suburban residents while conserving the environment.

4. Forest Lake resort cannot be built as a result of the decreasing populations of rare animal species in the region and the future use of Forest Lake as potable water.
Unit Three - Community Issues Analysis

Lesson Summary

Students use environmental issues investigation and evaluation skills to discover and evaluate community environmental issues by evaluating the positions, beliefs and values of people and organizations involved with an environmental problem within the community.

Goal

Students use environmental issues investigation and evaluation skills to analyze community environmental issues.

Duration

Ten periods (50 minutes each) or longer, depending upon the length of time spent on research, evaluation and presentation.

Learning Objectives and Standards

1. Environmental Education: Increase environmental issues analysis skills.

2. Community Service Learning: Determine solutions to a community environmental issue through identification of community needs.
3. Language Arts: Research, compose and orally present solutions to a community environmental issue.


5. Science: Understand ecological interactions.

6. Social Studies: Evaluate the positions, beliefs and values associated with a community environmental issue.

List of Materials

1. Newspaper articles of local environmental issues collected during Unit One and Two.

2. A copy of the Research Worksheet - Community Issues Analysis for each group and a copy of the Evaluation Worksheet - Community Issues Analysis for each student.

Preparation for Lesson

1. Assign teams of 2 or 3 students to evaluate the community environmental issue. These teams can be divided randomly, academically, or by student choice.

2. Each group should combine their newspaper articles. The newspaper articles should then be arranged into categories of nature, land use, air quality, water
use, water quality, resource use, recycling, and waste management. Additional categories may exist; therefore, instruct students to create new categories if appropriate.

3. Student groups should then rank each article on a scale of 1 to 5 with 1 being a national or international issue, 2 a state-wide issue, 3 a regional issue, 4 a County issue and 5 a local issue. The correct rank should be written on the top right-hand corner of each article. This information reflects the local influence of the issue.

4. Student groups should then skim each article to determine the extent to which players involved with the issue are discussed. Each reference to a player in the newspaper article should either be highlighted or underlined. After each article has been evaluated, students should write the total number of references within the newspaper article in the upper left-hand corner. This information reflects the ability to research the issue.

5. Student groups should then multiply the two numbers previously written on each newspaper article; the rank for issue locality (1-5) and number of references.
For example, a newspaper article of a local issue (5) with 20 references would receive a score of 100 (5 \times 20 = 100). Where as a newspaper article of a national issue (1) with 40 references would receive a score of 40 (1 \times 40 = 40). This number should be written in the center of the top of each newspaper article and then circled.

6. Student groups should then organize newspaper article categories in order of highest to lowest based on the circled number on each newspaper article. This system will allow students to determine which newspaper articles are locally influential and easy to research. The teacher should then assist each group in choosing the best issue to research since the newspaper article with the highest rank will not always be the best choice.

7. After choosing the best newspaper article to research, each student group should skim the remaining newspaper articles to determine if they contain any information pertaining to their community environmental issue. Newspaper articles having no relevance to the issue chosen by the student group should be placed in a location accessible to all student groups for research.
8. Each student group should receive a copy of the Research Worksheet - Community Issues Analysis. Student groups should complete Sections 1 and 2 of the Research Worksheet based on the information found in the relevant newspaper articles.

9. The teacher should explain to student groups that information about their issues can be found by collecting additional newspaper articles, interviewing players involved with the issue, making their own observations of the issue, using Internet search engines and web sites, conducting surveys, and reviewing public information documents.

10. Teachers should then facilitate 3 to 5 days of research during which student groups use Section 3 of the Research Worksheet for documenting pertinent information.

11. After research of the community environmental issue has been completed, students should use Section 4 of the Research Worksheet to summarize the position, belief and value of each player. Each player may have several positions, beliefs, and underlying values. The teacher may use the Reference Guide - Community Issues Analysis to provide students with values options.
12. Students should then work as a group to determine plausible solutions to the community environmental issue. Solutions should be based on a critical evaluation of the positions, beliefs, and values associated with the community environmental issue. Section 5 of the Research Worksheet should be used for this activity.

13. Upon completion, student groups should present their findings and solutions. Allow for a brief question and answer period to clarify the presentation. Each student should complete the Evaluation Worksheet - Community Issues Analysis while listening to student group presentations.

14. After all groups have presented, the teacher should facilitate a brief class discussion regarding the pros and cons of each groups solutions to their community environmental issue. Following the discussion, students should reflect on their own beliefs which led them to agree or disagree with the solution presented for each community environmental issue. In addition, they should reflect upon the value associated with each of their beliefs.
Section 1. Read over your newspaper articles and summarize the issue in your own words.
RESEARCH WORKSHEET - COMMUNITY ISSUES ANALYSIS

Section 2. Complete the following table based on information found within your newspaper articles.

<table>
<thead>
<tr>
<th>Player</th>
<th>What You Know</th>
<th>What You Need to Know</th>
<th>Where to Find</th>
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RESEARCH WORKSHEET - COMMUNITY ISSUES ANALYSIS

Section 3. Complete the following table with additional information found during your research.

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<tr>
<th>Player</th>
<th>Information</th>
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</table>
Section 4. Complete specific details for each player associated with the community environmental issue.

1. Player:
   Position:
   Belief:
   Values:

2. Player:
   Position:
   Belief:
   Values:

3. Player:
   Position:
   Belief:
   Values:

4. Player:
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7. Player:
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   Values:

8. Player:
   Position:
   Belief:
   Values:
Section 5. Review Sections 1-4 of the Research Worksheet prior to completing this section. Solutions should be based on a critical evaluation of the positions, beliefs, and values associated with the community environmental issue.

Solution 1:

Solution 2:

Solution 3:

Solution 4:

The best solution to the community environmental issue is:
EVALUATION WORKSHEET - COMMUNITY ISSUES ANALYSIS

Fill in the table with information from each presentation. Explain why you agree or disagree with the solution.

<table>
<thead>
<tr>
<th>Issue Description</th>
<th>Solution</th>
<th>Agree with the Solution?</th>
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REFERENCE GUIDE - COMMUNITY ISSUES ANALYSIS

1. Community environmental issue: a local problem related to the environment which is viewed by players, those who have an interest in the problem, as having several solutions.

2. Player: a person, group, or organization having some involvement or interest with a community environmental issue and possessing one or more beliefs related to the issue.

3. Belief: the opinion of a player in respect to a specific community environmental issue.

4. Value: the rationale for the belief held by a player in respect to a community environmental issue. Possible values include:
   1. Environmental - pertaining to chemical, physical, and biotic conditions in one's surroundings.
3. Ecological - relating to the interrelationship of organisms and their environment.

4. Aesthetic - a conception of beauty or pleasing appearance.

5. Economic - relating to the production, distribution, or consumption of goods or services.

6. Recreational - a hobby for refreshing strength and spirits.

7. Social - relating to interactions within human society.

8. Egocentric - concerned with one's own activities or needs rather than society.

9. Legal - conforming to or permitted by law.
Unit Four: Environmental Community Service Learning

Lesson Summary

Students use environmental community service learning to understand and assess community needs, acquire new knowledge of the community environment, develop civic responsibility through participation in a service learning project, and reflect upon personal reactions and the impact of the project on the community.

Goal

Students develop, implement and evaluate an environmental community service learning project.

Duration

Twenty periods (50 minutes each) or longer, depending upon the length of time spent on project development, implementation, and evaluation.

Learning Objectives and Standards

1. Environmental Education: Develop, apply, and evaluate positive environmental actions.

2. Community Service Learning: Develop, implement, and evaluate an environmental community service learning project.
3. Language Arts: Compose and reflect upon an environmental community service learning project.

4. Mathematics: Assess resource usage, quantities, and change within the community and during the project.

5. Science: Understand ecological interactions.

6. Social Studies: Develop and apply civic values through participation in the project.

**List of Materials**

1. For each group, a copy of sections 4 and 5 of the Research Worksheet - Community Issues Analysis form that each group presented during Unit Three.

2. A copy of the Ranking Worksheet - Environmental Community Service Learning, Goal Worksheet - Environmental Community Service Learning, and Events Worksheet - Environmental Community Service Learning for each group.

**Preparation for Lesson**

1. Assign teams of 2 or 3 students to evaluate the community environmental issue projects presented in Unit Three. These teams can be divided randomly, academically, or by student choice.
2. Each group should receive copies of sections 4 and 5 of the Research Worksheet-Community Issues Analysis form that each group presented during Unit Three.

3. Student groups should then rank each previously presented community issues analysis using the Ranking Worksheet - Environmental Community Service Learning. Each issue should be ranked on a scale of 1 to 5 for proximity, attainable action, and access to site. All three category ranks should be added to calculate an overall ranking for each issue. Appropriate environmental community service learning projects will have the highest ranks.

4. Each group should put their top one or two ranked issues on the board. The teacher should facilitate a class discussion to choose the best issue for use as an environmental community service learning project. At this time it may be appropriate for the teacher to list possible project ideas including public education, local clean-ups, community service events, site improvement, or creating a new program.

5. Once the class has chosen an issue for the environmental community service learning project, each
student group should devise goals for the project. The question “what do you want to have accomplished by the end of the project?” should be used by the teacher to elicit responses. Student groups should use section 1 of the Goal Worksheet - Environmental Community Service Learning to list and describe their goals. Each student group should try to formulate four goals.

6. Student groups should then present their proposed goals to the class. The teacher should keep track of the goals on the board or overhead. Upon completion of group presentations, the class should choose the four best goals for the project from those presented. The teacher should help the class modify goals to best fit the project. Student groups should use section 2 of the Goal Worksheet - Environmental Community Service Learning to list and describe the four goals chosen by the class.

7. A copy of the Events Worksheet - Environmental Community Service Learning should be given to each student group. Referencing the class goals, each group should fill in the Events Worksheet with a series of events needed to accomplish the goals. Teachers should insure
that groups are specific with required time, participants, and jobs associated with each event.

8. Student groups should then present their proposed events to the class. The teacher should keep track of the events on the board or overhead. Upon completion of group presentations, the class should choose the sequence of events that will insure the completion of the project. The teacher should help the class modify events to best fit the project. Student groups should use section 2 of the Events Worksheet - Environmental Community Service Learning to list and describe the events chosen by the class.

9. The teacher should then facilitate a class discussion regarding expected student work ethic and civic responsibilities; potential monetary costs; and rules and laws of the school, school district, and municipality.

10. Prior to implementation of the environmental community service learning project, students should individually reflect upon their personal values, feelings, and expectations in respect to the project. Students should write this pre-reflection in a notebook or journal.
11. Teachers should then facilitate the implementation of the project. The sequence of events created by the class should serve as the project guide. Teachers may want to reserve the right to make adjustments during the implementation of the project due to time and budget constraints.

12. During the implementation of the project, students should keep a daily journal of personal reflections. These reflections should include personal values, feelings, and expectations in respect to the project. Reactions to events during the implementation process should also be included.

13. Upon completion of the project, students should write a post-reflection describing how their personal values, feelings, and expectations changed during the project. The teacher should facilitate a brief class discussion regarding student reactions to the project.

14. As a culminating activity, each student should compose an environmental community service learning report. Teachers can use the Sample Report - Environmental Community Service Learning as a template for
the report. This report can be used as a formal assessment method for the project.
Use the table to rank each community issue analysis presentation from Unit Three.

<table>
<thead>
<tr>
<th>Issue Description</th>
<th>Proximity [5=close] (1-5)</th>
<th>Attainable Action [5=attainable] (1-5)</th>
<th>Access to Site [5=accessible] (1-5)</th>
<th>Total [sum of 3 rankings]</th>
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GOAL WORKSHEET - ENVIRONMENTAL COMMUNITY SERVICE LEARNING

Section 1. Your group should use the table to describe the goals of the project.

<table>
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<tr>
<th>Goal Description</th>
<th>Who Will be Involved?</th>
<th>How Will it be Accomplished?</th>
<th>What are the Expected Effects?</th>
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Section 2. Use the table to describe the goals of the project chosen by the class.

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<th>Goal Description</th>
<th>Who Will be Involved?</th>
<th>How Will it be Accomplished?</th>
<th>What are the Expected Effects?</th>
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EVENTS WORKSHEET - ENVIRONMENTAL COMMUNITY SERVICE LEARNING

Section 1. Your group should use the table to describe the events of the project.

<table>
<thead>
<tr>
<th>Event Description</th>
<th>How Much Time Will be needed?</th>
<th>Who Will be Participating?</th>
<th>What Jobs Need to be Completed?</th>
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Section 2. Use the table to describe the events of the project chosen by the class.

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<th>Who Will be Participating?</th>
<th>What Jobs Need to be Completed?</th>
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