

*The School Diversion and Environmental  
Education Law*



*Sample School DEEL Unit Plan*

*September 2005*

*Produced under contract by*

*The Acorn Group*



STATE OF CALIFORNIA

Arnold Schwarzenegger  
Governor

Alan C. Lloyd, Ph.D.  
Secretary, California Environmental Protection Agency

•

**INTEGRATED WASTE MANAGEMENT BOARD**

**Rosario Marin**  
Board Chair

**Rosalie Mulé**  
Board Member

**Cheryl Peace**  
Board Member

**Carl Washington**  
Board Member

**(Vacant Position)**  
Board Member

**(Vacant Position)**  
Board Member

•

Mark Leary  
Executive Director

For additional copies of this publication, contact:

Integrated Waste Management Board  
Public Affairs Office, Publications Clearinghouse (MS-6)  
1001 I Street  
P.O. Box 4025  
Sacramento, CA 95812-4025  
[www.ciwmb.ca.gov/Publications/](http://www.ciwmb.ca.gov/Publications/)  
1-800-CA-WASTE (California only) or (916) 341-6306

Publication #560-05-009

 Copies of this document originally provided by CIWMB were printed on recycled paper containing 100 percent postconsumer fiber.

Copyright © 2005 by the State Education and Environment Roundtable. Used by the California Integrated Waste Management Board with permission. This document may be reproduced for non-profit academic purposes.

*Prepared as part of contract nos. SCS-C110 and IWM03052 (total contract amount: \$621,000, includes other services not related to this report).*

*The California Integrated Waste Management Board (CIWMB) does not discriminate on the basis of disability in access to its programs. CIWMB publications are available in accessible formats upon request by calling the Public Affairs Office at (916) 341-6300. Persons with hearing impairments can reach the CIWMB through the California Relay Service, 1-800-735-2929.*

**Join Governor Schwarzenegger to Keep California Rolling.**

Every Californian can help to reduce energy and fuel consumption. For a list of simple ways you can reduce demand and cut your energy and fuel costs, Flex Your Power and visit [www.fypower.com](http://www.fypower.com).

**Disclaimer: This publication was produced under contract with The Acorn Group. Statements and conclusions contained in this publication are those of the contractor and not necessarily those of the California Integrated Waste Management Board, its employees, or the State of California and should not be cited or quoted as official Board policy or direction.**

**The State makes no warranty, expressed or implied, and assumes no liability for the information contained in the succeeding text. Any mention of commercial products or processes shall not be construed as an endorsement of such products or processes.**

The design for the School DEEL Unit Plan is based on the EIC Model™ Unit Plan developed by the State Education and Environment Roundtable (SEER). The Unit Plan design is the property of SEER and is used with permission by the California Integrated Waste Management Board (CIWMB).

# Table of Contents

---

Acknowledgments.....	ii
Project Director .....	ii
Writing Team .....	ii
Introduction.....	1
Project Background .....	1
Overview of the School DEEL Unit Plan.....	1
Purpose of the Sample School DEEL Unit Plan.....	2
Sample Unit Plan .....	2
General Information and Community Map .....	2
Unit Implementation Plan: Natural Resource Use in Ancient Civilizations .....	4
Local Context .....	6
Interdisciplinary Standards-Based Connections Set.....	7
Environmental Principles and Concepts-Based Learning Objectives .....	8
Community-Based Investigation.....	9
Unit Chronology.....	11
English/Language Arts Subject-Specific Lesson Plan .....	13
Math Subject-Specific Lesson Plan.....	14
Science Subject-Specific Lesson Plan.....	15
History-Social Science Subject-Specific Lesson Plan.....	16
Lesson Planning for the Community-Based Investigation .....	22
Service Activities .....	28
Assessment Strategies for the Community-Based Investigation.....	29
Timeline for Planning, Implementing, and Celebrating the Unit .....	30

The design for the School DEEL Unit Plan is based on the EIC Model™ Unit Plan developed by the State Education and Environment Roundtable (SEER). The Unit Plan design is the property of SEER and is used with permission by the California Integrated Waste Management Board (CIWMB).

# Acknowledgments

---

State Board of Education

California Department of Education

State Secretary for Education

## ***Project Director***

Tricia Broddrick (Sept. 2001–March 2004)  
Office of Education and the Environment  
California Integrated Waste Management Board

Joanne Vorhies (April 2004–present)  
Office of Education and the Environment  
California Integrated Waste Management Board

## ***Writing Team***

Jayne C. Henn  
State Education and Environment Roundtable

Linda L. Hoody  
State Education and Environment Roundtable

Grace M. Lieberman  
State Education and Environment Roundtable

Gerald A. Lieberman, Ph.D.  
Director  
State Education and Environment Roundtable

Jennifer Rigby  
Director  
The Acorn Group

# Introduction

---

## ***Project Background***

The School Diversion and Environmental Education Law (School DEEL) was signed into law in September 2001 (SB373, Torlakson, Chapter 926, Statutes of 2001). The law created a series of integrated waste management and education mandates for the California Integrated Waste Management Board (CIWMB). The legislation is intended to increase the presence of resource management programs, such as waste reduction, recycling, and composting on school district campuses statewide.

The School DEEL calls for developing, implementing, and adopting a plan for elementary and secondary schools in the state that includes the following elements:

- Coordinate instructional resources and strategies for providing active pupil participation with on-site conservation efforts.
- Promote service-learning opportunities between schools and local communities.
- Assess the impact to participating pupils on student achievement and resource conservation.
- Create models and school waste reduction tools for schools, school districts, county offices, and local agencies.
- Establish an Environmental Ambassador Pilot Program and a unified education strategy (UES).
- Provide grants to school districts to implement programs teaching source reduction, recycling, and composting.
- Identify and promote use of recycled-content materials and environmentally preferable products in the construction and modernization of public school facilities.
- Evaluate the effects of school waste reduction plans and other resource conservation efforts in the state's schools.

The School DEEL specifies that “Every school district and school site in this state will be encouraged to implement source reduction, recycling, and composting programs that ... (A) Reduce waste and conserve resources. (B) Provide pupils with a ‘hands-on’ learning experience.” (Public Resources Code section 42630) The legislation calls for the development of “service-learning partnerships, in which schools and communities work to provide real world experiences to pupils in areas of the environment and resource conservation, including education projects developed and implemented by pupils to encourage others to utilize integrated waste management concepts.” (Education Code section 51226.4)

## ***Overview of the School DEEL Unit Plan***

Thirteen school districts across California successfully completed the requirements of the School DEEL program. Schools in these 13 districts were required to develop and implement a standards-based instructional plan that used waste management practices and related resource use as the context for learning. The School DEEL Unit Plan provided opportunities for students to: participate in activities that integrated skills and knowledge from multiple subject areas; collect data regarding their community's waste generation and resource use; analyze data collected

during the auditing process; and, generate related service projects. The School DEEL grantees worked closely with community partners to enrich the instructional process and provide students with the expertise needed to complete their community-based investigations. These partners provided needed materials and supplies; assisted the schools during the administration of their unit plans; and, worked directly with the students during service activities.

### ***Purpose of the Sample School DEEL Unit Plan***

This *Sample School DEEL Unit Plan* is intended to serve as a guide to teachers and schools who want to create and implement an instructional unit that merges environment-based service-learning with academic study. Specifically, it is designed to help students: work toward mastery of sixth-grade standards; explore their community's use of natural resources; and, better understand California's Environmental Principles and Concepts, a component of the Education and the Environment Initiative (AB1548 Pavley, Chapter 665, Statutes of 2003).

The unit plan is structured for use at the beginning of the school year. Once the unit is completed and the students have developed a foundational level of knowledge regarding resource and energy use, they will be better equipped to comprehend the sixth-grade content standards in science and history-social science, particularly in the context of resource use among ancient civilizations. Regardless of time in history, human societies have always depended upon natural systems for their survival. Having students recognize this relationship is a key component of the Education and the Environment Initiative. Further, it is an effective strategy for making learning more relevant to students' lives.

The *Sample School DEEL Unit Plan* may be used in conjunction with the CIWMB document entitled: *The School Diversion and Environmental Education Law: Sample Campus Environmental Audits*. This tool details recommended auditing procedures for students and is available online from: [www.ciwmb.ca.gov/Publications/default.asp?pubid=1098](http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1098).

## **Sample Unit Plan**

---

The sample plan presented in this document offers a series of investigations and classroom lesson plans that examine past and present use of natural resources. It encompasses campus maps and community-based investigations, presents standards-based lesson plans in which California's new environmental principles and concepts are embedded, and integrates learning in science, history-social science, mathematics, and English/language arts. Although this unit plan features a fictional school, it is based on a compilation of real experiences gleaned from the School DEEL program.

### ***General Information and Community Map***

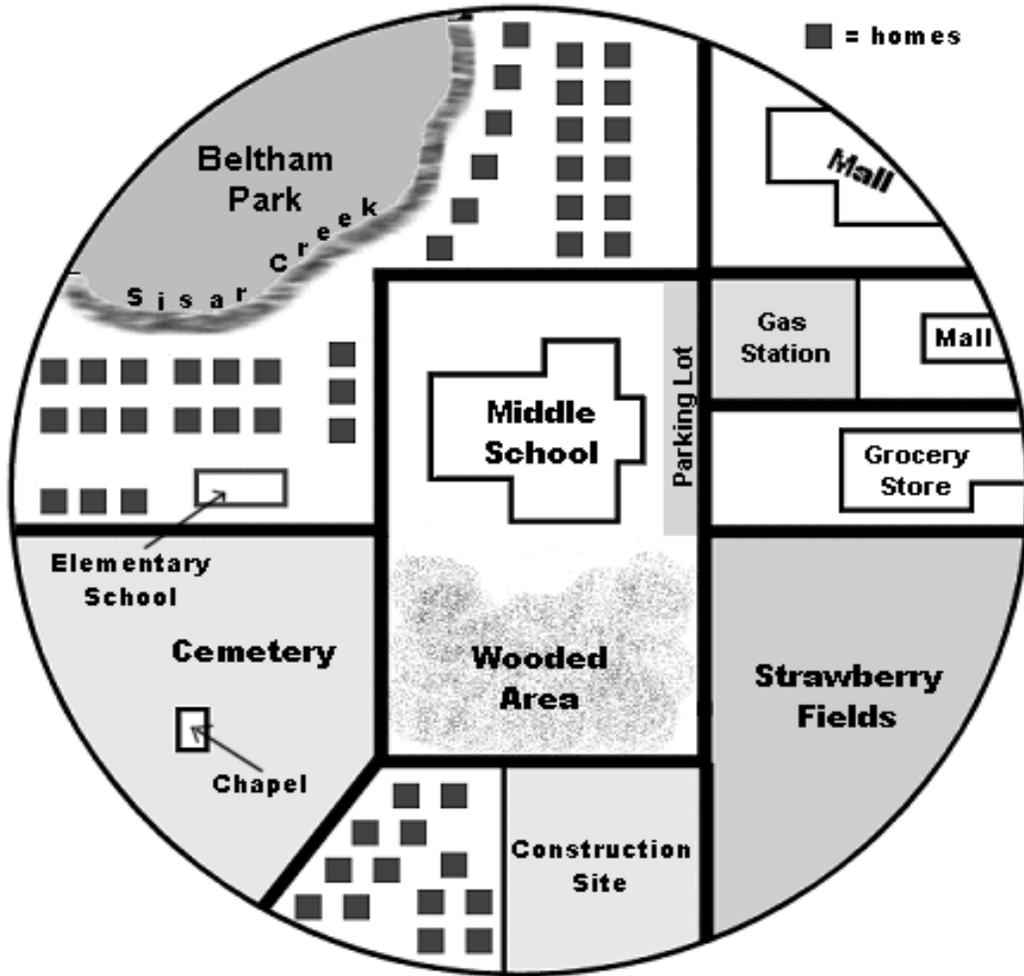
**Unit Name: Natural Resource Use in Ancient Civilizations**

comparison of the practices of ancient civilizations to practices at Sunshine Middle School (focused on history/social science standards studied in 6<sup>th</sup> grade).

**School Name:** Sunshine Middle School

**Grade-Level Focus:** Sixth Grade

# Community Map



## ***Unit Implementation Plan: Natural Resource Use in Ancient Civilizations***

### **Vision Statement**

Our staff and community will collaborate to enrich the academic environment and help students learn about ancient civilizations' use of natural resources by comparing such use with current practices at Sunshine Middle School. The instructional team and students will work together to develop a community-based investigation that will result in a service-learning project for our community. As we strive to help our students achieve higher academic standards, they will begin to: recognize connections between learning and the real world; become involved and caring citizens; take action that benefits the local environment; and, develop a sense of pride in themselves and their community.

### **Team Leader**

The sixth-grade history-social science teacher will act as the first team leader.

### **Leadership Team**

The Sunshine Middle School leadership team will involve: sixth-grade teachers (history-social science; science, English/language arts, mathematics, technology), the school principal, community partners, and, the parent-teacher association (PTA).

### **Advisory Committee**

Our advisory committee will include: diverse representatives of the cultural, political, and economic sectors of the community; students; school staff; parents; local landowners; resource agency personnel; and university faculty.

### **Engaging Administration at the District Level.**

In order to gain the support of school district administrators, the leadership team plans to:

- Host a reception for parents and school board members to present the overview, goals, and objectives of the program.
- Have the principal review the program plan with district office personnel and send monthly updates highlighting student, staff, and community interactions and progress.

### **Potential Stakeholders for Leadership Team and Community Partnership Network**

A diverse group of stakeholders will be invited to participate in the community network and leadership team, including representatives from: the town council and the waste hauler company, the school facilities manager, representatives from the school district purchasing office, the student body and student groups (student council, student store, etc.), the PTA, Sunshine Historical Society, the town's land use planning department, local environmental groups, and local businesses.

### **Case Statement Ideas for Garnering Program Support**

The leadership team plans to use the following points to gain support for the program:

- Increase academic achievement as students become involved and caring citizens, positively impacting the community, developing a sense of pride in themselves and striving to become life-long learners.

- Improve the quality of life in the community by having the students participate in a service-learning project that will meet one of the community needs they identify.
- Identify funding, partnerships, and volunteer commitment to ensure sustainability of program.
- Become a model learning community for other schools and communities.
- Create revenue for the school and community through funds generated by implementing more efficient waste management systems.

### **First Steps for Implementing the Unit**

As the first steps in implementing the program, the leadership team will:

- Review the draft unit plan with colleagues.
- Meet to revise the draft unit plan based on input from colleagues.
- Review the draft unit plan with the principal and revise it accordingly.
- Present the draft unit plan to all faculty, school staff, and the PTA.
- Finalize the unit plan and timeline for its implementation.

### **Identify funding and resource support to ensure sustainability of the program.**

The leadership team recognizes the need for some financial support and material resources and will:

- Meet with the School Site Council, school foundation, and district purchasing department.
- Identify possible grant opportunities from local businesses, community groups, and State agencies.
- Seek financial support/donations from community partners.

### **Plan community-wide events to celebrate student learning, student service, and school-community collaboration.**

The leadership team plans to work with the principal and PTA to:

- Place brief articles in the PTA newsletter to report to parents about progress in implementing the unit and service-learning projects.
- Host an in-house celebration with students, teachers, and appropriate community and resource partners.
- Organize quarterly student-led events to display progress on community-based investigations and service-learning projects.

### **Design a program evaluation plan and collect baseline data regarding implementation of the unit.**

The leadership team plans to:

- Work with the principal to identify the evaluation mechanisms that the school will use to judge progress with the implementation of the unit and associate service-learning projects.
- Conduct quarterly reviews of progress on the program with the principal.

- Maintain documents that record the participation of community partners and contributions of funds and materials.
- Monitor school progress on school improvement plans, student achievement, student behavior, and student attendance.

**Develop a long-range, strategic plan for program implementation.**

The leadership team plans to review its progress at the end of the first year, based on the evaluation data described above. Based on the results of that analysis, the team will revise its unit plans and present a long-range plan to the principal for consideration.

**Local Context**

Students will explore the concept of systems thinking and explain natural and social systems and their components, processes, and interactions. They will identify natural systems and social systems that are found at or near the school campus.

**Describe the natural system(s).**

Open space areas in the vicinity of the school include Beltham Park; strawberry fields; landscaped and wooded areas on campus; and the landscaped and natural parts of the cemetery grounds.

**Describe the relevant social system(s).**

Social systems in place at or near the school include the educational system, transportation systems, economic systems, energy supply systems, waste management systems, recreation systems, agricultural systems, and, housing.

**List the principal components and processes of the selected systems.**

Natural Systems	Social Systems
Air, water, soil, land, plants, animals, and natural resources, including energy resources. Energy and matter flow, decomposition, growth and development, photosynthesis, respiration (natural processes). Park, woods, creek, gardens/fields/cemetery grounds (natural locations and open space).	Humans, buildings, roads, vehicles, manufactured products, tools and equipment, money, laws and policies, religion, jobs (components). Consumption, purchasing, waste management, education, construction, landscaping, communication, supply and demand (processes).

**State an interaction of the above systems.**

The people and social systems in the community consume a variety of resources including: paper, agricultural products, energy, water, mineral resources, and the natural habitats that covered the land prior to human use. Waste is produced as resources are consumed in the course of a normal day. The waste management system of the community affects the natural areas of the community (litter, loss of open space), as well as affects the finances of members of the community. The waste created by the community also interacts with the larger environment. As demand for natural resources increases and by-products from resource use are produced, the health of natural systems is often compromised. Resource consumption by people at the school site requires resources from natural systems in the larger environment.

**Components and processes involved in the interaction:**

- Air, water, soil, land, plants, animals and natural resources, energy and matter flow, decomposition.
- Humans, buildings, roads, vehicles, manufactured products, tools and equipment, laws and policies, jobs, consumption, purchasing, waste management, education, construction, landscaping, communication, supply and demand.

**Potential effects of the interaction on the school or community.**

The interaction may bring about environmental change (including changes to the quality of air, soil, and surface water and groundwater) and alteration of habitat (which could change land-use patterns in the community and the aesthetic character of the land’s natural and social areas). As a result of these changes, the costs of carrying out business or living in the community, the availability of resources to members of the community, and the community’s laws and policies may be affected.

**State the possible causes of the interaction.**

- Social system processes and procedures require that resources be consumed in the community.
- The community legislates or puts in place policies that supply resources to the community and establishes waste management practices.
- Lack of awareness of alternative, potentially more cost-effective and environmentally-sound resource consumption options.

**Who or what seems to be affected.**

Without the necessary resources, the social systems in the community cannot function. Ultimately, the health of the community is dependent on the health of natural systems occurring in both the local and larger environment.

***Interdisciplinary Standards-Based Connections Set***

The leadership team, working with colleagues, identified three standards they want students to master through this unit. The team also identified other standards that will be addressed, applied, and reinforced during the implementation of this unit.

**English/Language Arts**

**Standard Targeted for Mastery**

Writing 2.2. Write expository pieces that state a purpose, explain a situation, and offer evidence.

**Other standards addressed in the unit:** Speaking 1.4, 1.7, 2.2.

**Math**

**Standard Targeted for Mastery:**

Statistics, Data Analysis and Probability 1.1. Compute the range, mean, median, and mode of data sets.

**Other standards addressed in the unit:** Statistics, Data Analysis and Probability 1.2, 1.3, 1.4, 3.2.

## **Science**

### **Standard Targeted for Mastery**

Resources 6b. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for this, students will know different natural energy and material resources including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests and know how to classify them as renewable or nonrenewable.

**Other standards addressed in the unit:** Resources 6c. Investigation and Experimentation 7c, 7f.

### **History-Social Science**

**Other standards addressed in the unit:** Chronological and Spatial Thinking 3. World History and Geography of Ancient Civilizations 6.1(1), 6.1(2), 6.1(3), 6.2(1), 6.4(1), 6.5(1), 6.6(1), 6.6(2), 6.6(6), 6.6(7), 6.7(3).

## ***Environmental Principles and Concepts-Based Learning Objectives***

The leadership team, working with colleagues, developed the following learning objectives to address California's Environmental Principles and Concepts (developed by the Education and the Environment Initiative).<sup>1</sup>

### **Environmental Principle I**

The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

#### **Targeted Environmental Concepts**

**Concept a.** Students need to know that the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures.

**Concept b.** Students need to know that the ecosystem services provided by natural systems are essential to human life and to the functioning of our economies and cultures.

#### **Learning Objectives. Students will:**

- Identify social systems that are present at the school.
- Identify social systems that are present in the local community.
- Describe how community needs are determined, and how they are met.

---

<sup>1</sup> For further information on the Education and the Environment Initiative, please refer to the Cal/EPA website, [www.calepa.ca.gov/Education/AB1548/](http://www.calepa.ca.gov/Education/AB1548/).

## **Environmental Principle II**

The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.

### **Targeted Environmental Concepts**

**Concept a.** Students need to know that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.

**Concept b.** Students need to know that methods used to extract, harvest, transport and consume natural resources influence the geographic extent, composition, biological diversity, and viability of natural systems.

### **Learning Objectives. Students will:**

- Identify natural systems, and system components and processes in the local community.
- Document resource use and waste generated within their community.
- Explain the interactions of natural and social systems in supplying a resource or product.
- Identify and describe interactions among natural and social systems in the local community.
- Predict how changes in the local community's resource management will affect the natural and social systems' interactions in and around the community.

## **Environmental Principle V**

*Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.*

### **Targeted Environmental Concept**

**Concept a.** Students need to know the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions.

### **Learning Objectives. Students will:**

- Describe the affects of individual decisions on the natural and social systems in the local community.

## ***Community-Based Investigation***

The leadership team, working with colleagues, developed the following community-based investigation to help students use the context of resource use at the school and in the local community as a basis for learning about resource use in ancient civilizations.

### **Focus of the Investigation**

Patterns of resource consumption in human communities, past and present, affect the health of the natural systems in and around the communities, and ultimately, the social systems of the communities themselves.

### **What is the community need that the investigation addresses?**

The local community wants to reduce costs of waste disposal and improve the local environment.

### **How does the investigation link to a problem or issue?**

By investigating resource consumption in the community, students will begin to understand how social systems influence the local community and learn how their actions and decisions can directly and indirectly affect the larger environment.

### **What are the goals and objectives of the investigation?**

- Determine the influence of the community's resource consumption on the local natural and social systems and larger environment.
- Outline the costs associated with consumption of various materials and products.
- Explore alternatives to current consumption patterns and waste management practices.
- Identify service-learning activities that students can undertake in order to bring about changes in consumption patterns and waste management practices.

### **What resources, such as technical experts, reference materials, and community organizations, are available to support the investigation?**

**Technical experts:** local waste management company, landfill management company, the park's oversight committee, local manufacturing and product/resource supply experts, school and district staff, local naturalists, historians, local governmental department/agency personnel (water board, waste board, school board, city council, etc.).

### **Website References**

California Integrated Waste Management Board ([www.ciwmb.ca.gov](http://www.ciwmb.ca.gov))

CalServe ([www.cde.ca.gov/calserve/](http://www.cde.ca.gov/calserve/))

National Service-Learning Clearinghouse ([www.servicelearning.org/](http://www.servicelearning.org/))

Rural School and Community Trust ([www.ruraledu.org/](http://www.ruraledu.org/))

### **What constraints might limit the scope of the investigation?**

- Insufficient planning time.
- Limited availability of reference materials or funding.

### **Organizing and Supporting Questions for the Community-Based Investigation**

Participating teachers and their students identified the following organizing and supporting questions to guide the community-based investigation and prepare them for learning about resource use in ancient civilizations.

**Organizing Question:** How do patterns of resource use (consumption) affect the local natural and social systems?

**Supporting Question 1:** What are the natural and social systems that comprise our community today? Historically, what natural systems encouraged the establishment of our community?

**Supporting Question 2:** What natural (renewable and nonrenewable) resources do we rely on in our everyday life? Which natural systems are involved in the generation of goods and services used by our community?

**Supporting Question 3:** Which social systems are involved in the purchase and delivery of goods needed by our community? Which components and processes are involved in the generation and disposal of our community's waste?

**Supporting Question 4:** How much waste does our community produce using the current waste management system?

**Supporting Question 5:** How do our community's current practices (use of resources/products and disposal of waste) affect renewable and nonrenewable resources and natural systems? How do our community's current patterns of resource use and waste generation/disposal affect social systems (economic, transportation, political)?

**Supporting Question 6:** What will eventually happen if our community maintains its current resource use and waste management practices?

**Supporting Question 7:** What possible changes to our community's current practices of resource use and waste disposal would have a positive effect on the natural systems on which our community relies? How can these effects be documented and monitored? (service-learning projects)

## ***Unit Chronology***

The leadership team, working with colleagues, developed the following chronology for logically addressing the organizing and supporting questions and teaching the activities in the unit. In order to most effectively achieve the learning objectives for the unit, the instructional team developed the chronology below to identify the sequence they would use to implement both the subject-specific activities and the community-based investigation activities. The numbered items below identify the specific activities, which are described later in this document.

### **Early Humans**

1. History/Social Science Activity 1.
2. History/Social Science Activity 2.

### **Hunter-Gatherers and the Neolithic Revolution**

3. History/Social Science Activity 3.
4. History/Social Science Activity 4.

### **Mapping the Campus**

5. Science Activity 1.
6. Community-based Investigation Activity 1.
7. Community-based Investigation Activity 2.
8. Community-based Investigation Activity 3.

### **Natural and Social Systems**

9. Community-based Investigation Activity 4.
10. Community-based Investigation Activity 5.
11. Community-based Investigation Activity 6.

12. Community-based Investigation Activity 7.
13. Community-based Investigation Activity 8.

### **Natural Resources**

14. Science Activity 2 (pre-assessment).
15. Science Activity 3.
16. Community-based Investigation Activity 9
17. Community-based Investigation Activity 10
18. Community-based Investigation Activity 11
19. Community-based Investigation Activity 12
20. Community-based Investigation Activity 13
21. English/Language Arts Activity 1
22. English/Language Arts Activity 2
23. Community-based Investigation Activity 14
24. Community-based Investigation Activity 15
25. English/Language Arts Activity 3 (Pre-assessment)
26. Community-based Investigation Activity 16

### **Community Audit Preparation**

27. Community-based Investigation Activity 17
28. Math Activity 1(Pre-assessment)
29. Math Activity 2
30. Math Activity 3

### **Community Audit(s)**

31. Community-based Investigation Activity 18
32. Community-based Investigation Activity 19

### **Community Resource Use Patterns**

33. Community-based Investigation Activity 20
34. Community-based Investigation Activity 21

### **Mapping Ancient Civilizations**

35. History/Social Science Activity 5
36. History/Social Science Activity 6
37. History/Social Science Activity 7
38. History/Social Science Activity 8

39. Community-based Investigation Activity 22

### **Service-Learning Activities**

40. Community-based Investigation Activity 23

41. Community-based Investigation Activity 24

### **Natural and Social System Interactions in Ancient China**

42. History/Social Science Activity 9

43. History/Social Science Activity 10

44. History/Social Science Activity 11

45. History/Social Science Activity 12

46. History/Social Science Activity 13

47. History/Social Science Activity 14

## **English/Language Arts Subject-Specific Lesson Plan**

**Author’s Note:** Science Research Associates’ (SRA) *Open Court* reading program identifies correlations to the California sixth-grade science and history-social science standards addressed in this unit plan. Science standards listed in both the unit plan and *Open Court* include: Ecology 5a–e; Resources 6b and c. History/social science standards listed in both include Chronological and Spatial Thinking 3, Historical Interpretation 6, and World History and Geography of Ancient Civilizations 6.1(2). The *Open Court* components aligned to these standards may be used in conjunction with, or in place of, the following lessons.

### **Standard(s) Being Addressed**

Writing 2.2

Speaking 1.4, 1.7

### **Pre-Assessment Strategy**

Students will write an expository essay about what it means to be a sixth-grader at Sunshine Middle School.

### **Remediation Strategy for Any Prerequisite Knowledge and Skills**

Have students read different types of writing and explain their characteristics and purposes.

### **Conducting an Interview**

#### **Learning Objectives. Students will:**

- Select a focus and an organizational structure for an interview.
- Use effective rate, volume, pitch and tone during an interview.

### **Adopted Instructional Materials and Other Resources**

Printed, audio-taped and videotaped interviews, interviewee “rating” sheets (rubric on how the techniques are used by the interviewer), student-designed interview scripts, *Write Source 2000* (Great Source Education Group, Wilmington, Mass., 1999).

**Summary Description: Activity 1**

Students observe several interviews in different media (e.g., in print, on audio and in video) and note the characteristics of each, paying particular attention to the techniques/conduct/mannerisms of the interviewer. Students compile a list of “proper” techniques for interviewing.

**Summary Description: Activity 2**

Students plan, conduct, and interview a classmate on an appropriate topic of their choice, demonstrating effective interview techniques. Interviewers practice taking notes on the responses of the interviewee, and the interviewee gives feedback to the interviewer on their techniques.

**Expository Writing****Learning Objective. Students will:**

- Write an expository composition in response to a given prompt.

**Adopted Instructional Materials and Other Resources**

*Holt Literature and Language Arts, Write Source 2000* (Great Source Education Group, Wilmington, Mass., 1999).

**Summary Description: Activity 3**

Students read expository essays and note their common features. Students discuss why those features are important to the purpose of the essay. Students then write an expository essay in the style of their choice to answer the prompt, “What does it mean to be a sixth-grader at Sunshine Middle School?”

**Math Subject-Specific Lesson Plan****Standard(s) Being Addressed**

Statistics, Data Analysis and Probability 1.1, 1.2, 1.3, 1.4.

**Pre-Assessment Strategy**

Quiz on finding range, mean, median, and mode of data sets.

**Remediation Strategy for Any Prerequisite Knowledge and Skills**

Class discussion to review understanding of averages, fractions and percentages.

**Mean, Median, and Mode****Learning Objective. Students will:**

- Compute the range, mean, median, and mode of selected data sets.

**Adopted Instructional Materials and Other Resources**

*Harcourt Math*, p. 106–108.

**Summary Description: Activity 1**

Students will take a quiz on means, medians, and modes for data sets. Students then collect quantitative data on their classmates (e.g., shoe sizes, height, and hair length) and qualitative data

on their classmates (eye and hair color, birthday month, type of pet, etc). Students discuss the differences between analyzing qualitative and quantitative data.

**Summary Description: Activity 2**

Students define and discuss range, mean, median, and mode in data. Students find the range, mean, median, and mode in the applicable data sets they have collected. Students write a definition and the formula for each in their math journals.

**Central Tendency and Outliers**

**Learning Objectives. Students will:**

- Describe how central tendency of data may be altered.
- Explain how the inclusion or exclusion of outliers affects the measurement of central tendency.
- Clarify why a specific measure of central tendency (mean, median, and mode) provides the most useful information in a given context.

**Adopted Instructional Materials and Other Resources**

*Harcourt Math*, pp. 109–111.

**Summary Description: Activity 3**

Students define and discuss “averages” and central tendency. Students compare the average and central tendency in their data sets (from the previous lesson) and identify central tendencies in other data sets. Students will discuss why central tendency is useful in real life. Looking at the data from the previous lesson, students will define outliers in data and discuss their effect on central tendency.

**Science Subject-Specific Lesson Plan**

**Standard(s) being addressed:**

Resources 6b.

Investigation and Experimentation 7f.

**Pre-Assessment Strategy**

Students will complete a quiz on material and energy resources to identify resources that are renewable, nonrenewable, or inexhaustible.

**Remediation Strategy for Any Prerequisite Knowledge and Skills**

Class discussion focusing on definitions of matter/energy and basic needs of living things.

**Drawing to Scale**

**Learning Objective. Students will:**

- Read and construct scale drawings.

**Adopted Instructional Materials and Other Resources**

*The Book of Where* by Neill Bell (Little, Brown Publishers)

### **Summary Description: Activity 1**

Students are introduced to scale drawings and the techniques used to make them. Students observe scale on maps and interpret distances, heights, and lengths from scale maps and drawings.

### **Renewable, Nonrenewable, and Inexhaustible Resources**

#### **Learning Objective. Students will:**

- Explain in writing that renewable resources are replaced over a relatively short time period (nonrenewable resources accumulate over such a long period of time that they must be considered as fixed, and inexhaustible resources have no practical limits).

#### **Adopted Instructional Materials and Other Resources**

Houghton-Mifflin, *Discovery Works*, “Breathable Air” and “Fresh, Clean Water,” E10–E13.

### **Summary Description: Activity 2**

Students will take a quiz on material and energy resources, identifying resources that are renewable, nonrenewable, or inexhaustible. Students use decoding skills and knowledge of prefix meanings to define the terms “renewable,” “nonrenewable,” and “inexhaustible” and write the definitions of each in their science journals.

Students examine a collection of products to determine what natural materials are represented by/in them. Students divide the natural materials they can identify into “renewable,” “nonrenewable,” and “inexhaustible” categories. The class discusses what might make a renewable resource, like water, nonrenewable for certain purposes.

### **Summary Description: Activity 3**

Students read about Earth’s resources in *Discovery Works*. Using a note-taking format, students record these items in their journals: two things they learned, one question they still have, and any new vocabulary.

## ***History-Social Science Subject-Specific Lesson Plan***

#### **Standard(s) being addressed:**

Chronological and Spatial Thinking (3).

World History and Ancient Civilizations 6.1(1), 6.1(2), 6.1(3), 6.3(4), 6.4(1), 6.5(1), 6.6(1), 6.7(3).

Ancient China - 6.6(1), 6.6(2), 6.6(6) and 6.6(7).

#### **Pre-Assessment Strategy**

Geography quiz: Map-reading skill assessment using maps of the world and the U.S.; students find locations and identify geological features. Students write essays on how early man lived, and what resources were used by early and ancient human civilizations.

#### **Remediation Strategy for Any Prerequisite Knowledge and Skills**

Review how to read a map, define the term “civilization.”

## Early Humans

### Learning Objectives. Students will:

- Recognize how hunter-gatherer societies met their needs (i.e., they depended upon the goods and ecosystem services that they obtained from natural systems).
- Identify the purpose of the development of tools and use of fire by hunter-gatherer societies (i.e., helping them extract, harvest, transport, and consume goods and use ecosystem services from the natural systems where they lived).
- Explain that even though humans today may use different tools and practices, they require the same goods and ecosystem services as those of hunter-gatherer societies to assure their survival.

### Adopted Instructional Materials and Other Resources

History-social science text.

#### Summary Description: Activity 1

Teacher facilitates students filling in the “What I Know” section of a “KWL” chart with what they know about early humans. Students write an essay describing daily life for early humans.

Students work in groups to put in order major events in human history. Discuss each period’s unique innovations (e.g., tool use by humans). Teacher emphasizes the meaning of the Latin prefixes and suffixes “paleo,” “meso,” “neo” and “lithic.”

#### Summary Description: Activity 2

Students read about human life in the Paleolithic, Mesolithic, and Neolithic periods in their texts. Teacher facilitates a discussion about how modern-day humans use different tools and practices, but require the same goods and ecosystem services as those of hunter-gatherer societies to assure their survival.

## Hunter-Gatherers and the Neolithic Revolution

### Learning Objectives. Students will:

- Recognize how hunter-gatherer societies met their needs (i.e., they depended upon the goods and ecosystem services that they obtained from natural systems).
- Identify the purpose of the development of tools and use of fire by hunter-gatherer societies (i.e., helping them extract, harvest, transport, and consume goods and use ecosystem services from the natural systems where they lived).
- Identify the locations of early human communities that populated the major regions of the world.
- Provide examples of the factors that influenced the settlement of early human communities in a variety of environments in each of the major regions of the world.
- Provide examples of new sources of clothing and shelter developed by humans from the Paleolithic era to the agricultural revolution.
- Recognize that as the climate warmed and the environment changed, human populations moved into new areas to obtain more goods and ecosystem services from natural systems.

## **Adopted Instructional Materials and Other Resources**

History-social science text, video on Earth's climate changes, world maps, world history timeline.

### **Summary Description: Activity 3**

Students describe hunter-gatherers and how they met their needs, including the use of fire, development of tools and nomadic lifestyles.

Students watch video on Earth's climate changes. After the video, ask students how climate changes might affect the way people live. Discuss how this would have related to hunter-gatherer societies.

### **Summary Description: Activity 4**

Students read about the "Neolithic Revolution"—how climate changes gave rise to the cultivation of plants, domestication of animals (dogs) and the first permanent settlements (Tell Abu Hureyra in Syria and Tell Sultan in the West Bank) of the Natufian cultures. Students locate settlements on a world map.

Teacher facilitates a class discussion on why certain areas of the world might have been chosen for settlement by humans in the Neolithic Period. Students identify the components of the environment that would have been beneficial to humans in meeting their needs. Students discuss how the Neolithic Revolution's innovations would have changed the natural surroundings.

## **Mapping Ancient Civilizations**

### **Learning Objectives. Students will:**

- Use a variety of maps and documents to identify features of ancient communities and to explain the historical migration of people, expansion and disintegration of empires, and the growth of economic systems.
- Identify the locations of early human communities that populated the major regions of the world.
- Provide examples of the factors that influenced the settlement of early human communities in a variety of environments in each of the major regions of the world.
- Compare the methods used by different early human communities to extract, harvest, transport and consume natural resources in the major regions of the world.
- Describe how humans adapted their practices to the goods and ecosystem services, as well as to the cycles and processes that operated in the natural systems that they inhabited.
- Map the locations and describe the major river systems that were important to the early civilizations of Mesopotamia, Egypt, and Kush and discuss the physical settings of those river systems.
- Identify the influence of the Aegean Sea and the surrounding region on the development of Greek city-states and an economy based on trade (i.e., the natural systems that provided the goods and ecosystem services necessary for settlement and trade).
- Provide examples of the goods and ecosystem services in the region that were the basis for trade and commerce among Greek city-states (resources).

- Provide examples of the natural resources (goods and ecosystem services) upon which early Indian civilizations relied.
- Provide examples of the natural resources (goods and ecosystem services) upon which the early Chinese civilizations relied.
- Map the location of the Roman Empire and the sources of natural resources used at that time.

### **Adopted Instructional Materials and Other Resources**

History-social science text, atlases, blank world maps (blueprint size), access to the library and Internet in the computer lab.

#### **Summary Description: Activity 5**

Students complete world maps showing continental boundaries in which ancient civilizations were established. Students use their history-social science books and atlases to “map” the political boundaries of the ancient Mesopotamian civilizations (around 1000 BC).

#### **Summary Description: Activity 6**

Students research the geography, topography, and physical features within the borders of the ancient civilizations. They construct symbols for each in a legend or key and then add those symbols to the maps within the borders of each civilization.

## **Resources and Power in the Ancient World**

### **Learning Objectives. Students will:**

- Compare the methods used by different early human communities to extract, harvest, transport and consume natural resources in the major regions of the world.
- Describe how humans adapted their practices to the goods and ecosystem services, as well as to the cycles and processes that operated in the natural systems that they inhabited.

### **Adopted Instructional Materials and Other Resources**

History-social science texts, world history timeline.

#### **Summary Description: Activity 7**

Teacher introduces the “supply and demand theory” of economics to the class, using examples from the civilizations they have researched. Students read about and discuss how the unique resources from the natural systems in each area of the ancient world were harvested and used, bringing power to the ancient civilizations.

#### **Summary Description: Activity 8**

Students review the timeline of world history, paying particular attention to the rise and fall of the ancient civilizations they have researched. The class discusses the rise and fall of the ancient civilizations in terms of resource needs, acquisition, and control.

## Natural and Social System Interactions in Ancient China

**Author's Note:** Although China is used in this example, the teacher should feel free to begin with any of the ancient civilizations in the sixth-grade curriculum.

### Learning Objectives. Students will:

- Identify the importance of water and the major river system of the Huang-He Valley to the origin of Chinese civilization and social systems (economic, political, legal, cultural, and religious).
- Provide examples of the natural resources (goods and ecosystem services) upon which the early Chinese civilizations relied.
- Provide examples of the Huang-He Valley's influence on development of the Shang Dynasty.
- Map the location of the major river systems in the Huang-He Valley.
- Provide examples of the factors that influenced the settlement of new areas in China (e.g., availability of natural resources).
- Describe the major geographic features of China and compare the geographic features that could influence governance, the spread of ideas, and the distribution of goods and services.
- Recognize how China's major geographic features influenced the consumption of natural resources and the associated effects on natural systems.
- Explain how the geographic features of China served to isolate the country from the rest of the world and provide examples of the effects of this isolation on China and the rest of the world.
- Recognize that the Han Dynasty depended on the goods and ecosystem services available to humans from the natural systems in the region.
- Identify that as the population of the Han Dynasty grew, more natural resources were required.
- Explain why the expansion of the Han Dynasty to new areas was necessitated by the growing demand for natural resources.
- Describe the forced immigration policies of the Han Dynasty and its extensive effort to catalog and keep records of the natural resources throughout China.
- Provide examples of how the resource supply methods and consumption patterns of the Han Dynasty affected the natural systems in the region.
- Explain the political organization and decision-making processes of the Han Dynasty as they related to the use and management of natural resources.
- Identify silk as one of the goods and ecosystem services provided by China's natural systems.
- Describe the silk trade's role in the growth of communities and populations in parts of China.
- Provide examples of how the silk trade directly and indirectly affected natural systems in the region.

- Cite the significance of the trans-Eurasian "silk roads" in the period of the Han Dynasty and Roman Empire and their locations.

### **Adopted Instructional Materials and Other Resources**

History-social science text, physical and political maps of China (one being a dynasty map with the names of the dynasties removed or covered).

#### **Summary Description: Activity 9**

Students observe and record the physical geography of China, including the river systems.

#### **Summary Description: Activity 10**

The class reviews the resources in the environment of China and discusses the ideal areas for settlement. Students compare their settlement predictions to the settlement patterns of the Chinese dynasties. Teacher focuses student attention on how humans used the river systems and their services to explain why settlement congregated in the river valleys.

#### **Summary Description: Activity 11**

Students discuss the geographic isolation of China in relation to the other ancient civilizations at the time. Using a world history timeline, students observe what was transpiring in other ancient civilizations between 1500 and 1000 BC. Students list the pros and cons of geographic isolation in relation to resource availability and civilization growth.

#### **Summary Description: Activity 12**

Students read about and discuss the Shang (Yin), Zhou, Qin and early Han dynasties, focusing on their use of and battles over natural resources. Students discuss the early construction of the Great Wall and early inventions of gunpowder, silk, paper, and porcelain as related to resources available and the economic and political power of the dynasties.

#### **Summary Description: Activity 13**

The class explores and analyzes the natural and social systems surrounding silk. Students discuss the history of the industry in ancient China and the establishment of the "silk road" during the Han dynasty. Students map the silk road and create a systems map of the silk trade in ancient China, showing the interactions of the natural and social systems involved.

#### **Summary Description: Activity 14**

Students consider how ancient China's cultural isolation was changed through the social systems of trade with western civilizations and predict how this change would affect the Chinese civilization.

## ***Lesson Planning for the Community-Based Investigation***

**Name of Community-Based Investigation: Patterns of Resource Use in Our Community**

**Standards Being Addressed**

English/Language Arts:

- Writing 2.2
- Speaking 2.2

Math:

- Statistics, Data Analysis and Probability 1.1, 1.2, 1.3, 1.4, 3.2

Science:

- Resources 6b, 6c
- Investigation and Experimentation 7c, 7f

History-Social Science:

- Chronological and Spatial Thinking 3.
- World History and Ancient Civilizations 6.1(2), 6.1(3).

### **Mapping the Campus**

**Standards-Based Learning Objectives. Students will:**

- Use a variety of maps and documents to identify physical and cultural features of their neighborhood and city (Chronological and Spatial Thinking 3).
- Make a scaled map of the school campus and surrounding community (Investigation and Experimentation 7f).
- Identify components of natural systems that are present on campus and in the local environment (Environmental Principle II).
- Identify components of social systems that are present on campus and in the local community (Environmental Principle I).

**Adopted Instructional Materials and Other Resources**

Campus and community maps.

**Summary Description: Activity 1**

Examine a variety of maps of their community, including school and surrounding neighborhood.

**Summary Description: Activity 2**

Work in small teams to create a map, to scale, of their school campus and community surrounding the school up to a mile radius from campus. (The teacher may want to take this opportunity to introduce students to drawing/mapping software, if available).

### **Summary Description: Activity 3**

Locate and label on their map(s): natural features, buildings, waste receptacles, dumpsters, recycling bins, and where resources are stored.

**Responsible Individual(s):** Teachers, parent volunteers, community partners.

**Timeline:** Three class periods and follow-up homework sessions as needed.

### **Identifying Systems**

**Standards-Based Learning Objectives. Students will:**

- Identify a minimum of 10 components and processes of a natural system represented on the school campus, or in the surrounding area (Environmental Principle II).
- Create a systems web of the school as a social system, including a minimum of 15 components and processes (Environmental Principle I).
- Identify and describe interactions among the school community and the natural systems in and around school (Environmental Principle II).

### **Adopted Instructional Materials and Other Resources**

Houghton-Mifflin *Discovery Works*, “Earth’s Ecosystems,” Unit D.

### **Summary Description: Activity 4**

- Discuss and define a “system,” beginning with students’ understanding of an ecosystem and its components and processes (including food webs, resulting transfer of matter and energy, and generation of by-products).
- Identify natural systems and social (human-made) systems, listing examples of each on the board. Students explain why they think systems are important. Discuss the relationship of natural systems to the resources we need/use.
- Identify components and processes, represented on their community map(s) that are part of natural systems (ecosystems). Discuss how humans are consumers within ecosystems.

### **Summary Description: Activity 5**

In teams, students explore the campus to observe and record components and processes of a natural system. (The teacher may wish to provide slips of paper with an area of the campus written on each slip, so each team may choose one area [garden, field, grove of trees, landscaped courtyard, etc.]) Teams should make a systems web of the components and processes they identify in the area they are assigned.

### **Summary Description: Activity 6**

Students complete a journaling activity that answers the questions “In one school day, how do I (individually) depend on the natural systems around me? What do I give and take from the natural environment?”

Working in small teams, students identify social system components and processes, represented on their campus map(s).

### **Summary Description: Activity 7**

The class uses the school as an example of a social system to make a systems web that shows the interactions of the components within it and the inputs and the outputs of systems to other systems. This activity is guided by the teacher, who refers to the campus map throughout the process.

**Summary Description: Activity 8**

The class discusses ways in which they think the school affects the natural systems they observed. For example, did they locate litter in the natural areas? Was there any evidence of damage to the components of the natural system brought about by human activity? Were any human-made (social system) objects (components) in the area? If so, what were they? What is their purpose? In what ways might these components affect the natural system with which they are interacting?

**Responsible Individuals:** Classroom teachers, custodial staff, community partners (e.g., city planner).

**Timeline:** Five class periods.

**Natural Resources**

**Standards-Based Learning Objectives. Students will:**

- Identify energy and material resources that are essential to human life (Resources 6b).
- Classify energy and material resources as renewable, nonrenewable or inexhaustible (Resources 6b).
- Compare the methods used by different early human communities to extract, harvest, transport and consume natural resources in the major regions of the world (History-Social Science 6.1[2]).
- Describe the methods used to extract, harvest, transport and consume natural resources and how those methods influenced the geographic extent, composition, biological diversity and viability of natural systems (History-Social Science 6.1[3]).
- Provide examples of how human practices and rates of consumption can affect the availability of energy and material resources that are essential to human life (Resources 6b).
- Identify different resource materials that are provided by natural systems (Resources 6b).
- Identify the natural origin of the materials used to make common objects (Resources 6c).
- Provide examples of goods that are produced by natural systems that are used to make common objects used by humans (Resources 6c).
- Explain the methods used to extract, harvest and transport the materials used to make common objects from natural resources (Resources 6c).
- Provide examples of how the methods used to extract, harvest, and transport natural resources and consume them (or make useable products of them) affect natural systems (Resources 6c).
- Identify and describe interactions among the school community and the natural systems in and around school (Environmental Principle II).

## **Adopted Instructional Materials and Other Resources**

Houghton-Mifflin *Discovery Works*, “Earth’s Natural Resources” Unit E; access to research materials in the library or on the Internet.

### **Summary Description: Activity 9**

As a class, identify natural materials used to make common classroom and school items and determine whether they are made using renewable, nonrenewable, or inexhaustible resources.

### **Summary Description: Activity 10**

Brainstorm as a class how to construct a systems web (concept map/spray diagram/flowchart) showing the system’s components and processes necessary to supply a student at the school with a common object/resource (pencil, book, items for the cafeteria, etc.).

Select an object at home and construct a systems web (concept map/spray diagram/flowchart) for the item from origin to their home. Students share their systems web (concept map/spray diagram/flowchart) with the class, discussing the renewable or nonrenewable nature of the resources used to produce and supply the object.

### **Summary Description: Activity 11**

Identify the resources in the local area that led to the original settlement of their community. Describe components of the community, past and present, that are directly related to harvesting/extracting, transporting, and consuming those resources.

### **Summary Description: Activity 12**

Discuss how resources consumed by humans and resulting byproducts affect natural systems. What natural resources are represented in the undeveloped areas of campus? How do they represent the goods and services we need/use? How does human activity affect the abiotic and biotic components of an ecosystem?

Contrast early human and modern methods used to extract, harvest, transport, and consume natural resources in the major regions of the world.

Research and write a description of how these methods influenced the geographic extent, composition, biological diversity, and viability of natural systems.

### **Summary Description: Activity 13**

Estimate the amount/number of the classroom/school resources the school uses in a month’s time.

In teams, students will brainstorm who on campus might have responsibility for ordering/requesting supplies and draft a survey letter asking them about their roles and responsibilities. Working with the teacher, students will develop a guideline for the type of letter, information to be requested, and, a rubric for completing an exemplary letter. Students will draft individual letters that solicit an interview with an identified school staff. Writing groups will review the letters (based on rubric), select a model letter, and send it to appropriate personnel.

### **Summary Description: Activity 14**

Student teams will prepare a script to conduct interviews with staff members who are responsible for ordering/supplying and monitoring resources necessary for operation of the school. Students will conduct the interviews and record responses.

**Summary Description: Activity 15**

Students will develop a tally sheet, analyze responses, and, create a matrix/chart of staff with responsibilities for ordering/supplying and monitoring resources necessary for operation of the school. The students may want to use stickers or make graphics depicting specific roles of people involved in bringing resources to school/campus.

**Summary Description: Activity 16**

Students will write an expository essay on how the resources/supplies are determined, ordered, delivered, stored, and distributed.

**Responsible Individual(s):** Classroom teachers.

**Timeline:** Eight class periods and homework sessions.

**Community Waste Audits****Standards-Based Learning Objectives. Students will:**

- Compute the range, mean, median, and mode of waste audit data sets (Statistics, Data and Probability 1.1).
- Identify different material resources that are provided by natural systems (Resources 6b).
- Classify energy and material resources as renewable, nonrenewable or inexhaustible (Resources 6b).
- Identify energy and material resources that are essential to human life (Resources 6b).
- Provide examples of how human practices and rates of consumption can affect the availability of energy and material resources that are essential to human life (Resources 6b).
- Identify the natural origin of the materials used to make common objects (Resources 6c).
- Document resource use and waste generated within their community (Environmental Principle II).
- Predict how one change in the community's resource patterns or waste management system could affect the natural and social systems' interactions in and around the community (Environmental Principle II).
- Identify and describe interactions among the community and the natural systems in and around the community (Environmental Principle II).

**Adopted Instructional Materials and Other Resources**

*The School Diversion and Environmental Education Law: Sample Campus Environmental Audit* (CIWMB pub. #560-05-007), section on "Solid Waste Audit Procedure," adapted to details of the community areas being audited.

**Summary Description: Activity 17**

Teacher facilitates a class discussion on what happens to materials/objects/resources used at the school and in the community when they are "used up." Students will share their prior knowledge and determine their awareness of the community's waste management system.

**Summary Description: Activity 18**

Students audit the waste streams from various areas of the community—the school, the park, a few homes in different neighborhoods, the agricultural areas, the cemetery, the construction site, a few business in the malls.

**Summary Description: Activity 19**

Students compile the data they collected in the audits, calculating means, medians, and modes.

**Responsible Individual(s):** Classroom teachers, community partners, custodian or facilities manager(s) at each location, city or county recycling coordinators, local waste haulers, parent volunteers.

**Timeline:** Three class periods.

**Community Resource Use Patterns****Standards-Based Learning Objectives. Students will:**

- Understand how additional waste diversion data added to data sets may affect computations of central tendency (Statistics Data and Probability 1.2).
- Understand how the inclusion or exclusion of outliers affects the measurement of central tendency (Statistics Data and Probability 1.3).
- Construct appropriate graphs from data collected during the waste audit and develop qualitative statements about the relationships between variables observed (Investigation and Experimentation 7c).
- Prepare and deliver informative presentations on audit findings (Speaking Applications 2.2).
- Identify different material resources that are provided by natural systems (Resources 6b).
- Provide examples of how human practices and rates of consumption can affect the availability of energy and material resources that are essential to human life (Resources 6b).
- Identify the natural origin of the materials used to make common objects (Resources 6c).
- Document resource use and waste generated in their community (Environmental Principle II).
- Predict how one change in the community's resource patterns or waste management system could affect the natural and social systems' interactions in and around the community (Environmental Principle II).
- Identify and describe interactions among the community and the natural systems in and around the community (Environmental Principle II).

Adopted Instructional Materials and Other Resources:

*Harcourt Math*, data from waste audits, English/language arts text

**Summary Description: Activity 20**

Students review how to select most appropriate graphs for different types of data. Students work in audit groups to construct appropriate graphs, showing comparisons of different types of resources consumed and quantities of waste from the location they audited. Teachers take the

opportunity to teach about central tendency and how outliers affect the measurement of central tendency.

**Summary Description: Activity 21**

Students discuss how resource use and waste management practices relate to availability of energy and material resources in the larger community.

**Summary Description: Activity 22**

Students analyze their audit findings and consider their study of ancient civilizations to create presentations for audiences at the various locations that were audited (site administrators and school board, business owners, parks and recreation personnel, home owners, city personnel, etc).

Student groups give oral presentations of their findings, selecting the five most important discoveries made during their audits to share with their audience(s).

**Responsible Individual(s):** Classroom teachers, technology teacher, community partners, agencies, other school staff, parents, personnel representing local media.

**Timeline:** Three to five class periods and supporting homework sessions. Student presentation schedules will vary.

## ***Service Activities***

**Standards-Based Learning objectives. Students will:**

- Construct appropriate graphs from data collected during the waste audit and develop qualitative statements about the relationships between variables observed (Investigation and Experimentation 7c).
- Write an expository essay describing a resource use or waste management problem and proposing a solution (Writing 2.2).
- Write a formal proposal of solutions addressing an identified community need (Environmental Principle V).
- Communicate appropriately with adult members of the community during the course of their service (Speaking 2.2).
- Demonstrate one personal goal to improve resource use or waste management at school, at home, or in the community (Environmental Principle V).

**Summary Description: Activity 23**

Students will conduct research on ways to assist the areas of the community they audited in improving their resource use or improving their waste diversion rates. Students will use the data from their audit, conduct research, and confer with experts to write proposals to the community partners and offer their assistance in establishing new systems.

**Reflection Strategy: Activity 24**

Record in journals areas of personal commitment to meeting identified community needs. Teachers provide writing prompts as needed (e.g., “How have you made a difference in your school or community through this project?”).

## **Celebration**

Spring Open House to showcase student work and community involvement with partners.

**Responsible Individual(s):** Classroom teachers, other school staff, community partners, “experts” in the fields of waste diversion, energy and water conservation, and green procurement.

**Timeline:** Ongoing following the student presentations.

## ***Assessment Strategies for the Community-Based Investigation***

**English/Language Arts** (Writing 2.2). The pre-assessment tool will be the expository essay students write in English about what it is like to be a sixth-grader at Sunshine. The post-assessment tool will be a writing assignment assigned at the conclusion of the community-based investigation. Growth in students’ ability to write an expository essay will be assessed. Both pieces will be scored using the same rubric.

**Math** (Statistics, Data Analysis and Probability 1.1). The pre-assessment will be based on the results of the math quiz. For the post-assessment, students will take the chapter test from the math text. Possible extension: Students will contrast audit data from another class or campus. They will display data using a variety of graphing methods and determine the mean, median, and mode, using multiple data sources. Assessment will entail documenting growth in students’ accuracy in calculating means and identifying medians and modes of given data.

**Science** (Resources 6b). Pre-assessment data will be drawn from the student essay on resources. Post-assessment data will be gathered through a teacher-created test on material resources. Possible extension: Students will select a common object and draw a diagram, or concept map, delineating the life of the object. This would include harvesting of raw materials, manufacturing, distributing, and disposing of the object. Students’ growth in their understanding of resources and their ability to classify them as renewable, nonrenewable, or inexhaustible will be assessed.

### **Collaborative Instructional Team**

- Educators and school staff.
- Principal.
- Community partners including waste management personnel, district office and warehouse personnel, local CIWMB representatives, recycling center personnel, business owners, parks and recreation department personnel, homeowners and neighbors, city planners, town council members, individuals from local media, and historical societies.

**Additional Support Mechanisms:** Parent volunteers, other school staff.

### **Teaming Considerations**

Teachers must plan so as to give students blocks of work time to conduct research, interviews with staff, and the audits and complete written work.

The grade-level teaching team will work together to plan times to team-teach certain lessons within the community-based investigation. Students may rotate between their rooms on different days for certain lessons.

The teachers will work with the administration to get a shared prep time so they can better collaborate on instruction and student management.

## ***Timeline for Planning, Implementing, and Celebrating the Unit***

**Planning:** Summer (three days).

**Development:** Summer and fall.

**Implementation:** Fall and winter (over 4 weeks).

**Evaluation:** At the end of the school year (at conclusion of assessment pieces and service-learning project).

**Celebration:** Spring (after service-learning project is underway and students have planned further investigations).