Grade
Fourth grade

Project Title
Animal Houses

Environmental Big Picture
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. Students will understand that an organism's needs must be met in order for it to survive.

Educator Bio
Becky Reid is currently teaching a third/fourth grade combination class at Sunset View Elementary. She has also worked in special education, both as a teacher and a nonclassroom resource teacher.

She has been involved in science education for at least 20 years and has been a member of the K-12 Science Alliance for 5 years.

School/District
Sunset View Elementary, San Diego Unified School District

Courses Involved in Project
grade four science as part of a cross-curricular unit

Learning Outcomes
Students will know:

- That plants are the primary source of matter and energy entering most food chains.
- That producers and consumers are related in food chains and food webs and may compete with each other for resources in an ecosystem.
- That living organisms depend on one another and on their environment for survival.
- The difference between renewable and nonrenewable sources of energy and will identify places where nonrenewable energy can be used in an animal theme park.

EEI Alignment
The following EEI learning objectives are addressed by this project:

- Recognize that living things have needs that must be met for survival (including energy).
- Recognize that plants are the primary source of energy for living things in an ecosystem.
- Explain how living things meet their needs and survive by using resources (e.g., matter and energy) from their environment.

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- Recognize that some resources within an ecosystem, including those upon which humans depend, are readily available and others are limited in supply.
- Recognize that living things meet their needs by using resources (goods and ecosystem services) from the environment around them.
- Recognize that some resources within an ecosystem are finite in supply; others are less limited.

CA Standards Alignment

Science Standards:
2. All organisms need energy and matter to live and grow. As a basis for understanding this concept:
a. Students know plants are the primary source of matter and energy entering most food chains.
b. Students know producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem.
3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:
c. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Lesson Topics/Conceptual Flow

Taking Care of the Earth - Sustainability

Engage:
Read *Legend of the Lorax* and use it as a springboard for discussion about our environment.

Engage students in a discussion about what animals and people need in order to live and thrive. Discuss why people build houses differently in different parts of the world.

Explore:
Show DK video, *Animal Houses* (or any video segment showing how different animals construct their homes).

Explain:
Students work in small groups to discuss why animals build homes, what materials they use and why, and where animals build homes.

Students create a preliminary bubble drawing of what their animal's home could look like.

Explore:
Take a field trip to the City of San Diego Environmental Services Department to learn about building ecology and green materials.

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Explain:
Discuss why Ridgehaven is called a “green” building. Share energy consumption changes after Ridgehaven was converted to a green building. Identify energy saving changes that helped reduce energy use.

Explore:
Play the *World Real Estate* game. This activity reinforces the idea that the size of any population, including the human population, has an upper limit due to the finite amount of essential resources available to support the population.

Students will define carrying capacity, calculate land availability per person, and identify what portion of the Earth is arable land.

Energy Efficiency and Resource Conservation - Solar Design Experiment
Students work in groups using the Internet and other resources to determine the most efficient power sources to use in their entertainment zones.

Environmental Landscape Design
Students use reference books and Internet sites to research plants that grow without extra water in our region. Students draw a landscape plan and transfer it to their model base.

Explain:
Students create an animal enclosure that incorporates principles of sustainable design. Students then explain how their exhibit will meet the needs of the animal they selected, and how the enclosure they will build meets the criteria for sustainable building.

Elaborate:
For their final presentation students present to a jury panel of parents, visiting architects, and other community members.

Evaluate:
Does the exhibit leave all land, air, water, and habitats adjacent to the site undisturbed? Does student’s explanation include knowledge that plants are the primary source of matter and energy entering most food chains? Does student’s explanation include knowledge that producers and consumers are related in food chains and food webs and may compete with each other for resources in an ecosystem? Does student’s explanation include knowledge that living organisms depend on one another and on their environment for survival?

Action Project Description

The intent of this project is to introduce students to sustainable design principles and responsible stewardship of our precious resources.

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During this unit each student will research an endangered animal, design a zoo enclosure, and prepare a presentation board explaining the choices made when designing for a specific animal.

Each student will create an exhibit for an animal they select. The exhibit will use sustainable design principles and educate visitors about the importance of taking care of our earth.

How can you create animal enclosures and exhibits that will be fun and exciting and teach people to take care of the earth?

Students will draw an energy plan of the site and identify the natural elements, needs, and sources of energy. Students will show how their exhibit incorporates the elements of energy generation and reuse.

The park will leave all land, air, water, and habitats adjacent to the site undisturbed and will provide suitable habitats for local area wildlife.

All water used in the park must be recycled. All power used for the theme park shall be obtained by renewable energy sources. Students will be required to explain how their exhibit is powered when presenting their individual exhibits.

All exhibit areas must have a waste and recycling system that is user-friendly and self-contained.

I recruited a parent who is an architect to talk to the class about design in manmade and natural environments. Built Environment Education Programs (BEEP) will work with teachers if they have volunteers available. If you cannot find a speaker there are many green building sites available on the Internet for teacher background material.

I use grade-level curriculum to teach lessons about the earth's renewable and nonrenewable resources.

This unit could also include a field trip to the San Diego Wild Animal Park. Ask for a tour that emphasizes successful endangered species breeding programs and their park recycling program. Discuss density, land use, zoning, human scale, movement of animals, supplies, and people, transportation, and the natural elements that impact site.

Take a field trip to SeaWorld. Have students select five exhibits and use notebooks to record one way each exhibit complements the natural environment, and one way it does not. Students use notebooks to record ideas they can use when designing their own animal enclosures.

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Connections to Other Disciplines

Social Studies Connection – *Early Encounters-Inevitable Conflict Between English Settlers and Native Americans.*

Math Connection - It would be helpful if the measurement and geometry unit was taught ahead of time or concurrently. Students need to understand area and perimeter when designing enclosures.

Key Questions for Socratic Discussion:
Should animals be kept in zoos to entertain visitors?
Can zoos inspire a genuine interest in and concern for wildlife?

Resources (Field Trips, Speakers, etc):

San Diego Zoo or San Diego Wild Animal Park- take a field trip and have students pay special attention to animal enclosures. http://www.sandiegozoo.org/

SeaWorld San Diego- take a field trip and have students pay special attention to animal enclosures. http://www.seaworld.org/education-programs/swc/index.htm

San Diego Natural History Museum offers a Teacher's Guide for its exhibits "Water: H-2-O=Life" and "Water: A California Story." http://www.sdnhm.org/exhibits/water/Water_TeachGuide.pdf

People and the Planet: Lessons for a Sustainable Future; Pgs. 51 – 56, Zero Population Growth, 1996.

BuildingGreen.com has lots of information on sustainable and alternative building practices. www.buildinggreen.com

Energy Star has information about products and practices to save energy and resources. www.energystar.gov

California Energy Comission's Consumer Energy Center has the latest information about energy resources. www.consumerenergycenter.org

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