GRADE LEVEL: This lesson is designed for a grade 6 science classroom.

SCIENCE CONCEPT: This lesson is aimed at helping students understand that an ecosystem is a group of living organisms that interact with the living and nonliving features of their environment. This lesson also provides opportunities for students to practice making observations and applying them to their own lives to make real world connections.

RELATIONSHIP TO CALIFORNIA SCIENCE CONTENT STANDARDS:

5. e *Students know* the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

LEARNING OBJECTIVE:

1. Students will identify five living and nonliving features of ecosystems.

EVALUATION IDEAS:

1. formative:
    a. Students will document two living and nonliving features that they think will be found inside the MHC's habitat, which is their cage inside the classroom.

    b. Students will formulate a hypothesis to address one living and nonliving feature that they think will be found inside the MHC's natural ecosystem.

2. summative:
    a. Students will share their ecosystem representations with the class during a three-minute presentation, addressing each of the five living and nonliving features that they drew and labeled.

    b. I will ask students to describe two examples about what they have noticed in terms of the similarities between their ecosystem representations and the MHC's natural ecosystem with regards to their respective living and nonliving features.

CONCEPTUAL BACKGROUND: Any group of living and nonliving things interacting with each other can be considered an ecosystem. The survival of humans, like all living organisms, is dependent on the living and nonliving features of a particular ecosystem. In order to teach this lesson well, the teacher must fully comprehend the definitions of, and interrelationship between the living and nonliving features of an ecosystem. The teacher must also acknowledge and explain to students that the MHC cage is not an accurate representation of their natural ecosystem. The MHC cage serves merely as an unnatural habitat.

Definitions:

Ecosystems - Any group of living and nonliving things interacting with each other.

Habitat – An environment that is inhabited by a particular species.
Biotic – Describes a living feature of an environment (i.e. snake, tree).

Abiotic – Describes nonliving chemical and physical features of an environment (i.e. temperature, rocks).

LESSON IMPLEMENTATION PLAN: This lesson, which is designed as a guided inquiry, involves students observing a population of MHC that live and interact together in a cage, which constitutes a habitat. Based on their observations, students will form two hypotheses to address two living *and* nonliving features that they think will be found inside the MHC's natural ecosystem (the dry spiny forests of Madagascar). Students will then create a visual representation of their own *ideal ecosystem* in which they label five living and non-living features. Student's ecosystem representations can be in the form of a colored drawing or a collage made of pictures from magazines and newspapers.

ENGAGE – I will pose a question to students: "In what ways do you interact with the living and nonliving features of your ecosystem?" I will provide relevant examples of how populations of organisms interact with the living and nonliving features of their ecosystem. I will also explicitly discuss how living and nonliving features are interrelated and how removing one factor impacts the availability of other ecosystem resources. For example, plants would not be able to grow without an adequate amount of sunlight and water. A plant shortage would thus inhibit the survival of herbivores such as deer and cattle, which in turn would negatively affect populations of carnivores that feed on these two animals. I will pose another question to students: "What living and nonliving features do you think you'll find inside the MHC's natural ecosystem?"

EXPLORE – Students will observe the MHC in their cage, or habitat. Based on their observations, students will form two hypotheses to address two living *and* nonliving features that they think will be found inside the MHC's natural ecosystem. Students will then create a visual representation of their *ideal ecosystem* in which they label five living and nonliving features. Student's ecosystem representation can be in the form of a colored drawing or a collage made of pictures from magazines and newspapers.

EXPLAIN –I will ask students to describe what they have noticed about the similarities between their two hypotheses and their ecosystem representations with regards to living and nonliving features. I will facilitate each discussion, adding comments and undertaking direct teaching if necessary, until every student can articulate an understanding of how to competently identify living and nonliving features of ecosystems. I will ask students, for example, "How would eliminating one of the nonliving features from your *ideal ecosystem* impact some of its living features?"

ELABORATE – I will elaborate on the learning of the same concepts in different contexts by having students watch an informational video that describes the natural ecosystem of Madagascar Hissing Cockroaches, with emphasis on its living and nonliving features.

EVALUATE –

a) formative: I will assess student's knowledge by having them create a visual representation of their *ideal ecosystem* in which they label five living and nonliving features. Student's ecosystem representation can be in the form of a colored drawing or a collage made of pictures from magazines and newspapers.

b) summative: I will assess student's knowledge by having them document in their notes five living *and* nonliving features found in the MHC's natural ecosystem based on the informational video.

DIFFERENTITATION PLANS:

Behavioral for Student A – Provide hyperactive students with additional supervision during the classroom observations, *ideal ecosystem* activity, and informational video to ensure that they are participating adequately throughout the lesson.

Cognitive for Student B – Provide inattentive students with additional explicit instruction about how to determine the living and nonliving features of an ecosystem.

Cognitive for Student C – Provide non-artistic students with assistance in creating their ecosystem representations.

Affective for Student D – Provide temperamental students with an appropriate level of praise to promote their participation in lesson activities.

Language Demands for Students E – Use pictures from magazines and newspapers to accompany speech in order to assist ELL students in comprehending how ecosystems consist of living and nonliving features.

F – Simplify vocabulary for ELL students. For example, explain that the word *home* is similar to the word *habitat,* and that the word *environment* is similar to the word *ecosystem.*

G – Provide ELL students with additional time to create their ecosystem representations.

LIST OF MATERIALS (FOR STUDENTS):

- Two pieces of binder paper, one piece of printer paper, writing utensil, markers, crayons, colored pencils, scissors, glue, magazines and newspapers (that have pictures of living and nonliving features of ecosystems)

SAFETY CONCERNS/SPECIAL INSTRUCTIONS:

- To ensure the safety of all, students and teachers are prohibited from touching the MHC or their cage.