MPA Lesson Plan for Valley Christian High School: Cerritos, CA

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Background: Lesson Plan for 9th Grade biology to be used within the unit on Fish. This lesson plan will take one block (85 minutes).

Content Standards: Our school uses the McReal standards

Standard 6. Understands relationships among organisms and their physical environment

1. Knows how the interrelationships and interdependencies among organisms generate stable ecosystems that fluctuate around a state of rough equilibrium for hundreds or thousands of years (e.g., growth of a population is held in check by environmental factors such as depletion of food or nesting sites, increased loss due to larger numbers of predators or parasites)

3. Knows that as matter and energy flow through different levels of organization in living systems and between living systems and the physical environment, chemical elements (e.g., carbon, nitrogen) are recombined in different ways

5. Knows ways in which humans can alter the equilibrium of ecosystems, causing potentially irreversible effects (e.g., human population growth, technology, and consumption; human destruction of habitats through direct harvesting, pollution, and atmospheric changes)

Objectives: Students should be able to answer the following essential questions.
What are MPA's?
Where are MPA's in Southern California?
What is the biology in and outside of MPA's for Southern California?
Why are MPA's important?

Relevant Terms: MPA, Biomass, Density, Size, Biodiversity, Spillover

Materials: Ruler, Southern California Coastal Map (NOAA San Diego to Santa Rosa #18740), String, Overhead transparency, overhead pen, Candy (assortment of sizes)

Procedures:
1. Hand out MPA Survey. The pre-lesson survey assesses the prior knowledge the student has of the subject. (see attached survey)
2. MPA Location Activity: Students will determine how much of the Southern California coast is an MPA. (see attached student handout)
3. Coastal Sampling Activity: Students sample candy from two buckets and compare candies sampled to sea organisms that live in and outside of MPA's. One bucket has a

spectrum of large to small candy. The other bucket only has a few types of small candy. Students will answer questions on the student's handout.

4. Spillover Activity and Presentation: Students will use an overhead transparency and draw out the possible spillover for a Southern California MPA and then write down a few key ideas about spillover. Students will do a quick 1 minute presentation about their interpretation of spillover.

Assessment: Students will hand in the handout with the activities. The handout also includes a homework assignment that needs the use of the internet.

Marine Protected Areas Activity Name_____

Directions:

I. MPA Location Activity: Become familiar with the Coastal map of Southern California. Look at the key and explanations. Notice on the coastline the highlighted areas; these are Marine Protected Areas (MPA).

   A. Use the string and make it fit the coastline from Santa Monica to Dana Point. Use the Map key and determine the total distance in Miles. Then measure the State Marine Conservation areas, State Marine Parks, and State Marine Reserves.

      1. What is the distance from Santa Monica to Dana Point?

      2. How many miles of State Marine Conservation Area?

      3. How many miles of State Marine Park?

      4. How many miles of State Marine reserve?

      5. How many total miles of MPA's?

      6. What % of the coastline is MPA's?

II. Coastal Sampling Activity: There are two buckets with candy in them. One bucket represents the MPA ecosystem and the other bucket represents area that is not protected. The candy represents different species of coastal organisms. The smallest pieces of candy represent plant and larval organisms and the very large pieces of candy represent the larger fishes.

   A. Randomly pick 10 pieces of candy from each bucket.

      1. Which ecosystem had a greater biodiversity? Explain your answer.

      2. Why would a protected area have more diversity?

3. Weight your 10 pieces of candy. Which ecosystem has more biomass?

4. Why would a protected area have a greater biomass?

5. Measure the size (length) of your sampled organisms. What is your average length?

6. Why would protected areas have larger sized organisms?

7. Larger organisms produce more offspring. How would larger organisms impact the density of organisms in a MPA?

III. Spillover Activity and Presentation: Each group should take one overhead transparency and pen. Pick one MPA and draw an outline of the "spillover" of organisms from the MPA areas. Also list why organisms spill out of MPA's and why this is a very good occurrence for coastal ecosystems. Choose one person to explain your overhead notes in less than one minute.

A. Write a summary of "spillover" from the presentations and the discussion.

IV. MPA online homework

A. Go to the California Fish and Game website. http://www.dfg.ca.gov/mlpa/

1. What are the 4 sections under the marine tab?

2. Search these sites an explain something of interest to you.

3. From the MLPA web page, click on the "Why the initiative?" and explain "Why" in the space below

4. Click on the Frequently asked questions. Which question did you most relate to and what was the answer?

5. On the tab on the left, when and where is the next meeting?

6. Under "Popular Resources" click on the Channel Isnands Marine Protected Areas. Look over the information and describe something of interest.

California Coastline Survey

1. Fishermen can keep any fish they catch along the coast.

Strongly agree Agree Undecided Disagree Strongly Disagree

2. Fishermen can fish anywhere along the coast.

Strongly agree Agree Undecided Disagree Strongly Disagree

3. Trampling of tidal pools organisms is greatly impacting the local rocky shore ecosystems.

Strongly agree Agree Undecided Disagree Strongly Disagree

4. The density of organisms is the same all along the coast.

Strongly agree Agree Undecided Disagree Strongly Disagree

5. The biodiversity along the coast doesn't change that much going North or South.

Strongly agree Agree Undecided Disagree Strongly Disagree

6. The entire coastline is a Marine Protected Area (MPA).

Strongly agree Agree Undecided Disagree Strongly Disagree

7. All coastlines need protection.

Strongly agree Agree Undecided Disagree Strongly Disagree

8. Creating a Marine Protected area would change the ecosystem for the better.

Strongly agree Agree Undecided Disagree Strongly Disagree

9. Marine Protected areas should have a greater biodiversity and organism density.

Strongly agree Agree Undecided Disagree Strongly Disagree

10. The state government helps to fund and enforce Marine Protected Areas.

Strongly agree Agree Undecided Disagree Strongly Disagree

11. Have you ever taken a natural object (sand, sea shell, rock) from the coast? If Yes what?

12. Have you ever take a living organism on your trips to the coast? If yes what?

13. How many times do you go to the coast in a year?