Title: What Shapes an MPA? A simulation activity on creating boundaries for California's Marine Protected Areas

Objectives: To understand the goals of an MPA
To create the boundaries for an MPA or a series of MPA's based on scientific research and stakeholder interests, understanding the limitations of your design.

Audience: High School Living Environment Students

Time: 2 – 3 class periods (1 for introduction and fact sheet, 1 + for design and discussion, along with assessment.

NYS Core Curriculum Standards:

1.1.1c Science provides knowledge, but values are also essential to making effective and ethical decisions about the application of scientific knowledge.

4.1.1c In all environments, organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total ecosystem.

4.7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.

Materials: Simulation activity
Background information
Overhead Graph Paper, dry erase marker
Internet

Relevant Vocabulary:

MPA – marine protected area
SMCA – state marine conservation area
SMP – state marine park
SMR – state marine reserve

Background:

MPA's (marine protected areas) are the main tool to use to practice marine ecosystem management. There are three different types of MPA's. An SMCA is a state marine conservation area which limits recreational and/or commercial extractive activities but allows others. A SMP (state marine park) is more restrictive in that it prohibits all commercial activities that are extractive but does allow for some recreational extractive activities. SMR's or state marine reserves are the most restrictive and prohibit all extractive activities. These are the NO TAKE MPA's. In California, all three of these types of MPA's dot the waters off the coast however less than 0.01% of US waters are in marine reserves.

In 1999, the MLPA (marine life protection act) of California became law. It was designed to improve the incoherent array of MPA's in California's waters by establishing a master planning team consisting of every imaginable stakeholder and supported by a SAT (science advisory team). There were 6 goals:

- to protect natural diversity and function of marine ecosystems
- to help sustain and restore marine life populations
- to improve recreational, educational, and study opportunities in areas with minimal human disturbance
- to protect representative and unique marine habitats
- to establish clear objectives and effective management practices
- to ensure MPA's are designed and managed as a network.

Since MPLA's inception, the state waters have been divided into five study sections. Four sections have gone through the process and only Southern California is left. This area seems to be the most troublesome, perhaps because the warm waters create more stakeholders.

Activity:

Your task today is to use the provided information to determine the best 30 block area to create an additional MPA or series of MPA's near Santa Catalina Island, off the coast of Southern California. Currently, there is a no-take reserve on the northwest side of Catalina (see below).

http://coexploration.org/reg/swebsock/0013712/0493329/CW/main/viewitem.cml?6202+11+918+10131+0+0+1+x#here

A lot needs to be considered when designing an MPA. How big should it be? Should you have one or more than one? How far apart should they be? The MLPA established certain parameters including:

- Key habitats must be represented including intertidal/nearshore, subtidal and oceanographic habitats.
- MPA should extend from intertidal through offshore oceanographic regions with a minimum of 3 – 6 miles along the shore and 6 – 12 miles preferred.
- 3-5 replicates of each key habitat in each MPA. If more than one MPA is to be established the maximum spacing should be 31 – 62 miles apart.
- Minimum threshold size of 3 miles for each key habitat.
- 90% threshold for different habitats determines each habitat patch

Other considerations factor in. Is the MPA large enough to encompass adult movement for a range of species? Are proposed MPA's close enough together so larvae can move from one MPA to another? What is the best way to increase spillover (adults moving out of MPA when overcrowded)?

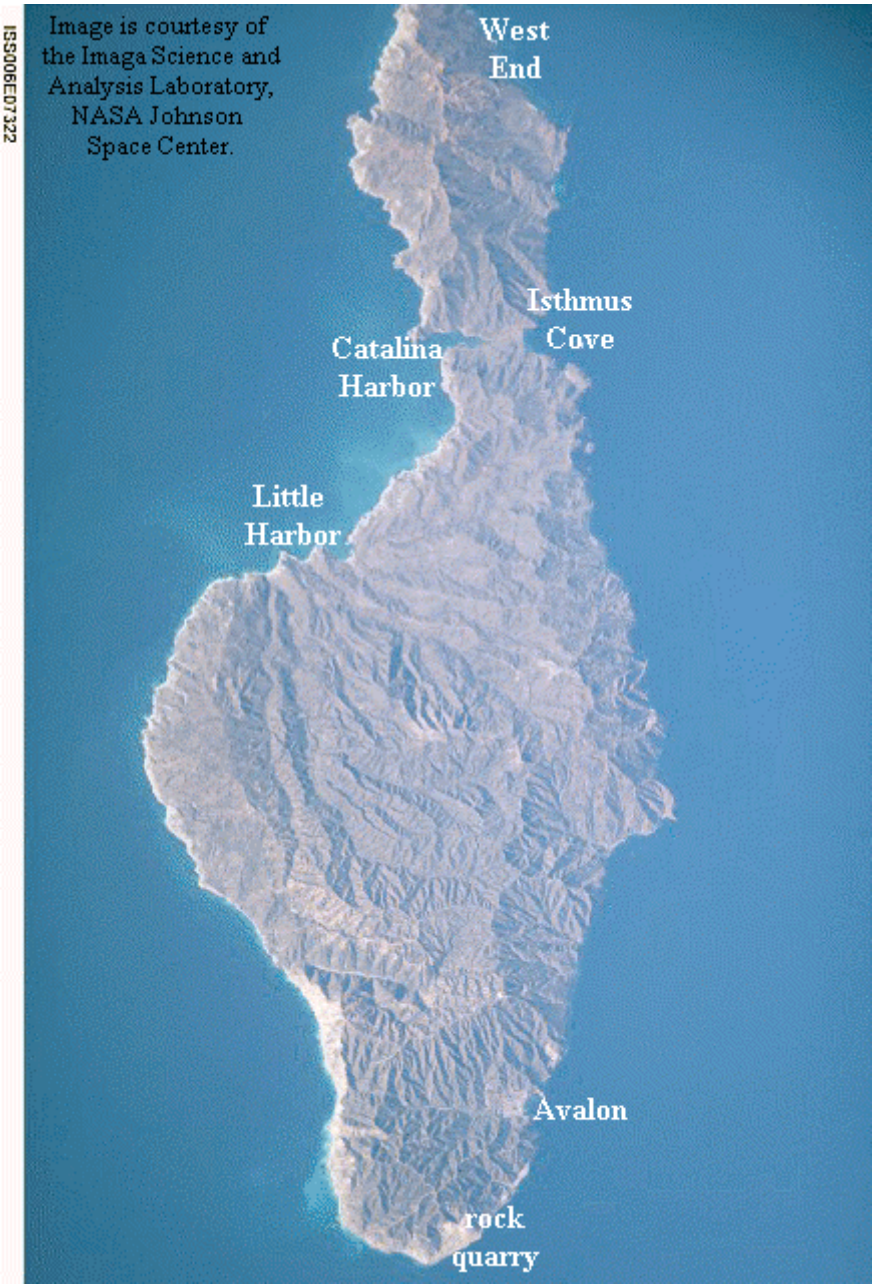
Using these guidelines, go to the following website and write down relevant facts to assist you in your design. List them on your fact sheet.

http://www.werc.usgs.gov/sandiego/pdfs/CatReport2004.pdf

Now, it's time to design. Start by tracing the outline of Catalina Island on your overhead graph paper. Next, using the information you gathered, decide which 30 boxes to shade in to protect the surrounding waters. Be prepared to justify your reasoning to the class.

Fact Sheet: **Student Name**_____

Santa Catalina Island, California



www.cnsm.csulb.edu/.../CatalinaIsland.htm

Assessment:

1. What problems did you have deciding where to put your boxes?

2. Which species would be best protected by your plan and why?

3. Which species would be least protected with your plan and why?

4. Whose plan do you think would be most successful and why?

5. Rank how the following stakeholders would approve you plan from most approval to least and explain why:
    a. Commercial fishermen
    b. Recreational fishermen
    c. Sport fishermen
    d. Surfers
    e. Beach-goers
    f. Educators
    g. Scientists

6. What problems do you think California is facing trying to create effective MPA's off Catalina Island?